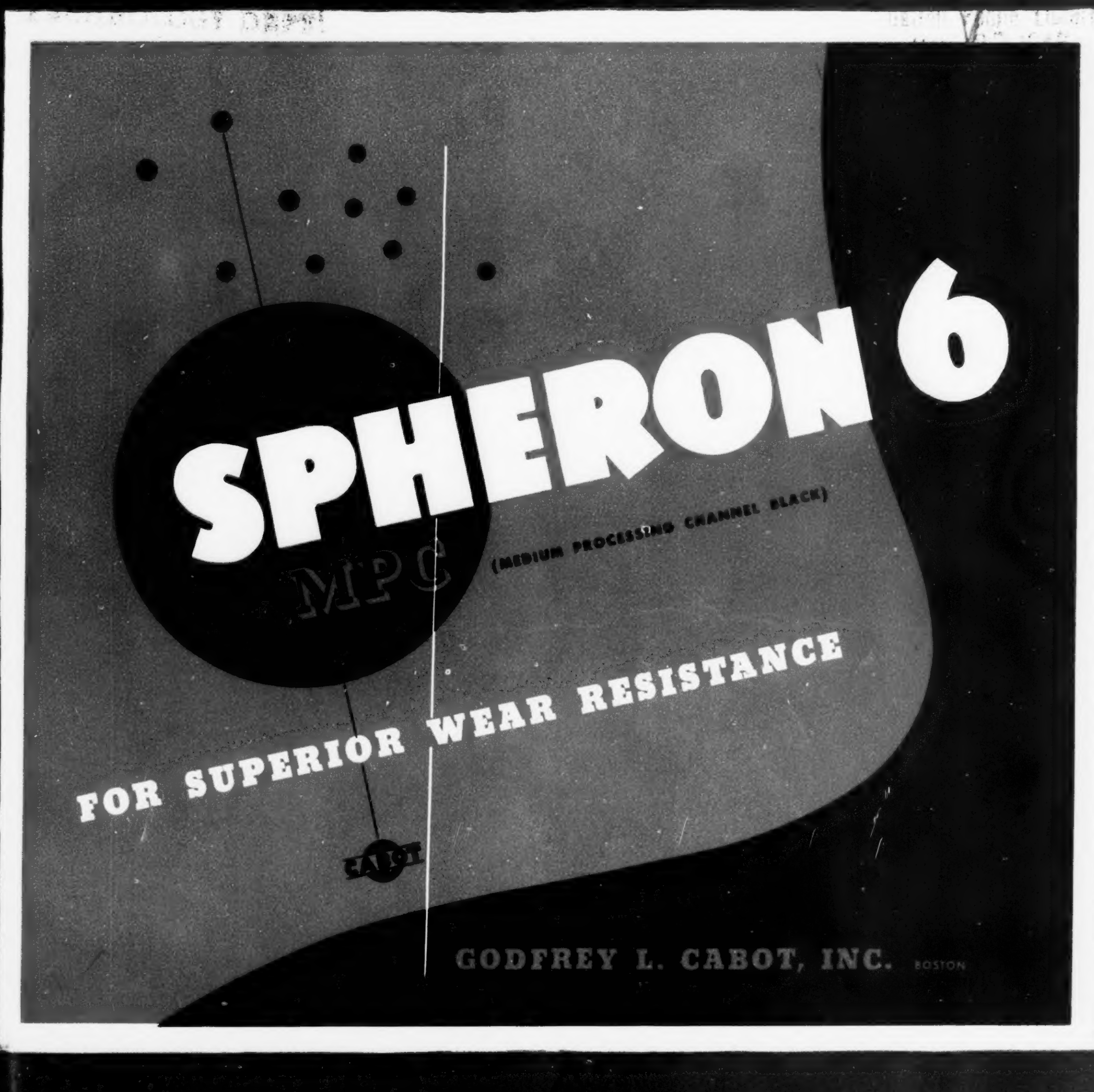
INDIA

RUBBER WORLD

NTHETIC

JULY, 1946



Du Pont

NEWSLETTER No. 7, JULY 1946

RUBBER CHEMICALS DIVISION

PUBLISHED BY E. I. DU PONT DE NEMOURS & CO. (INC.), WILMINGTON 98, DELAWARE

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- **Stability to Various Vulcanizing Conditions**
- **Freedom from Bleeding, Migration, Crocking**
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DU PONT *SELECT* RUBBER COLORS cover a wide range of hues—produce almost any hue in the visible spectrum when blended in proper proportions.

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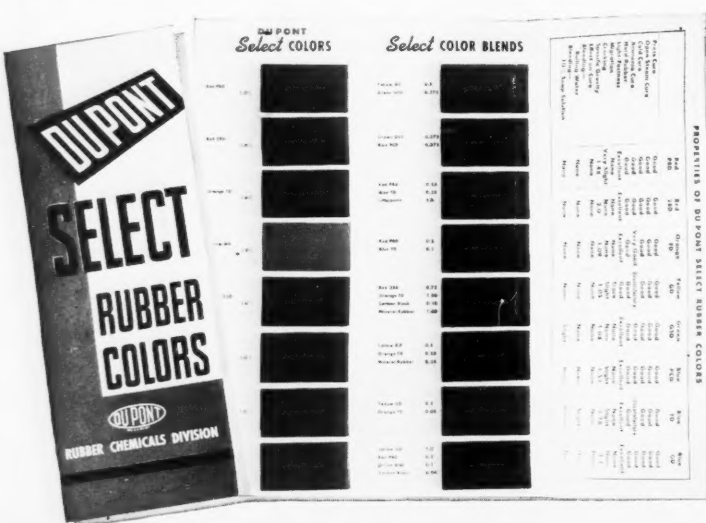
Pleasing, permanent effects can be obtained with *Select* Colors in neoprene latex.

ABOUT COLOR MATCHING

When requesting an exact color match, it is necessary for you either to supply us with your exact formula along with brands and types of ingredients used in the base in which the color is to be used or even better a pound or two of your base stock. Be sure also to supply us with method, temperature, and time of cure.



WRITE FOR THIS COLOR GUIDE!—

Shows 16 samples of Du Pont SELECT Colors, blends, and their properties. Also gives the basic formula used in preparing these samples. Just address E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division, Wilmington 98, Del. (For further data on Du Pont SELECT Colors, ask for Report BL-156.)

* * *

DU PONT

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

INDIA RUBBER WORLD, July, 1946, Vol. 114, No. 4. Published Monthly by BILL BROTHERS PUBLISHING CORP. Office of Publication, Orange, Conn., with Editorial
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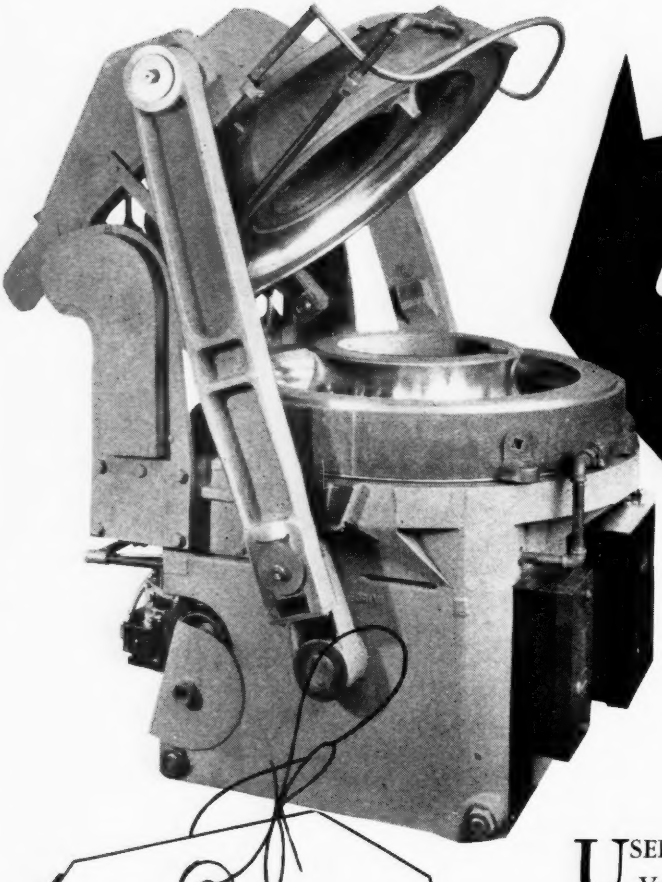

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TUBE VULCANIZER
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Exclusive Features

Full floating lower mold half is supported by rubber diaphragm operating on same air pressure that inflates tube.

Positive seal between mold halves assured by uniform bearing on register . . . rind worries are over.

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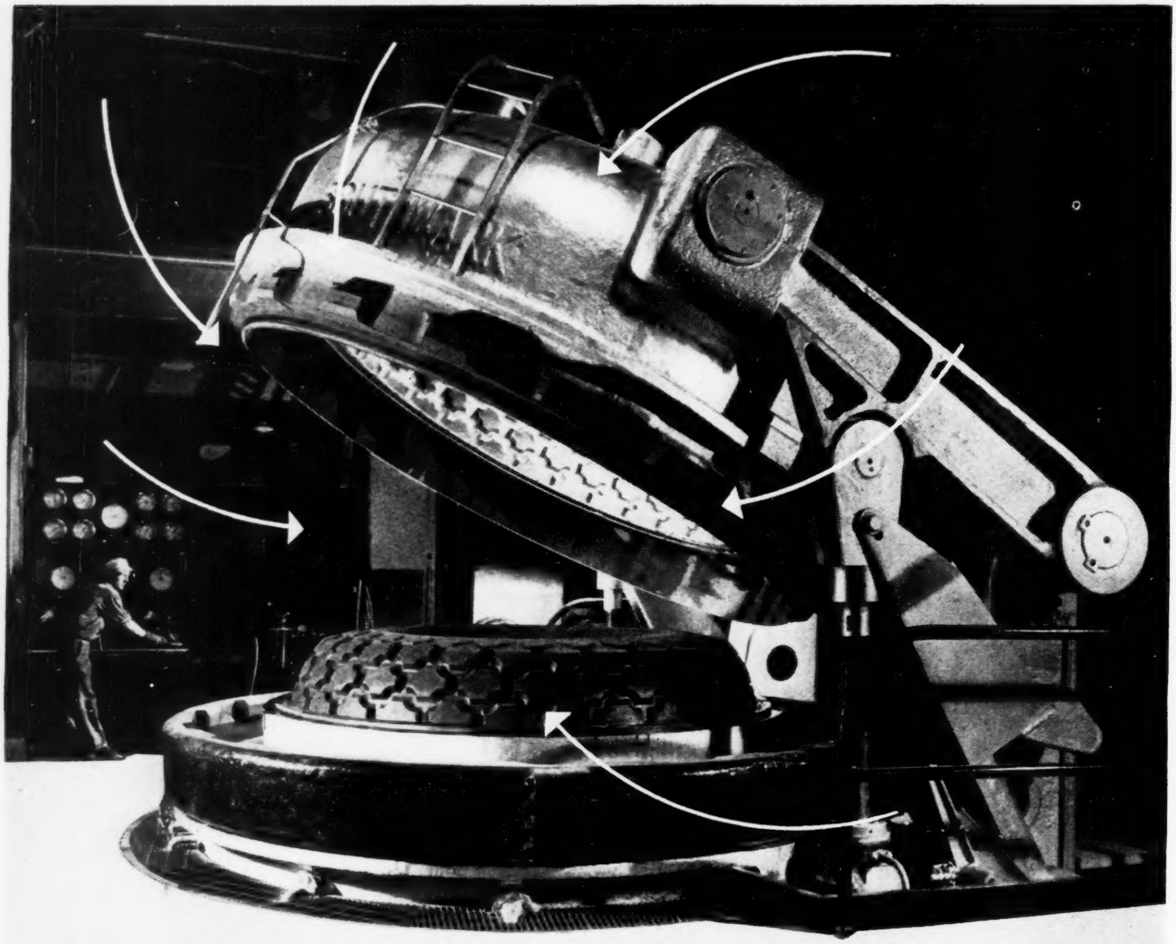

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them up
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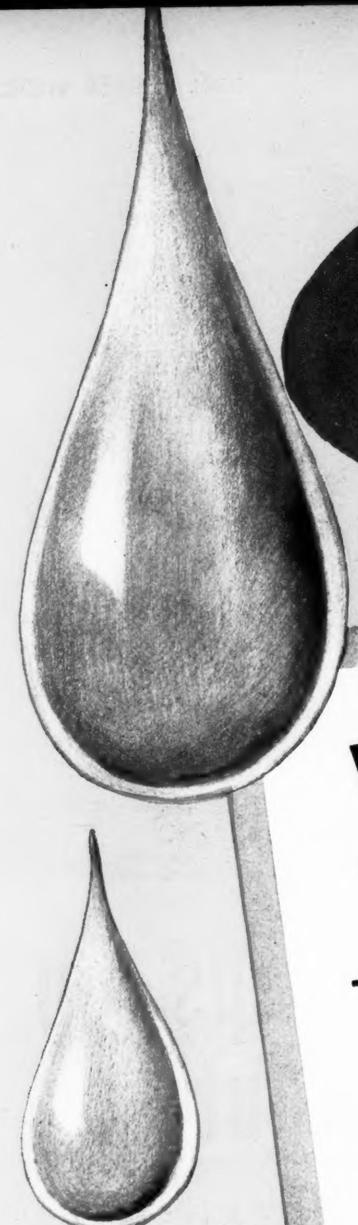
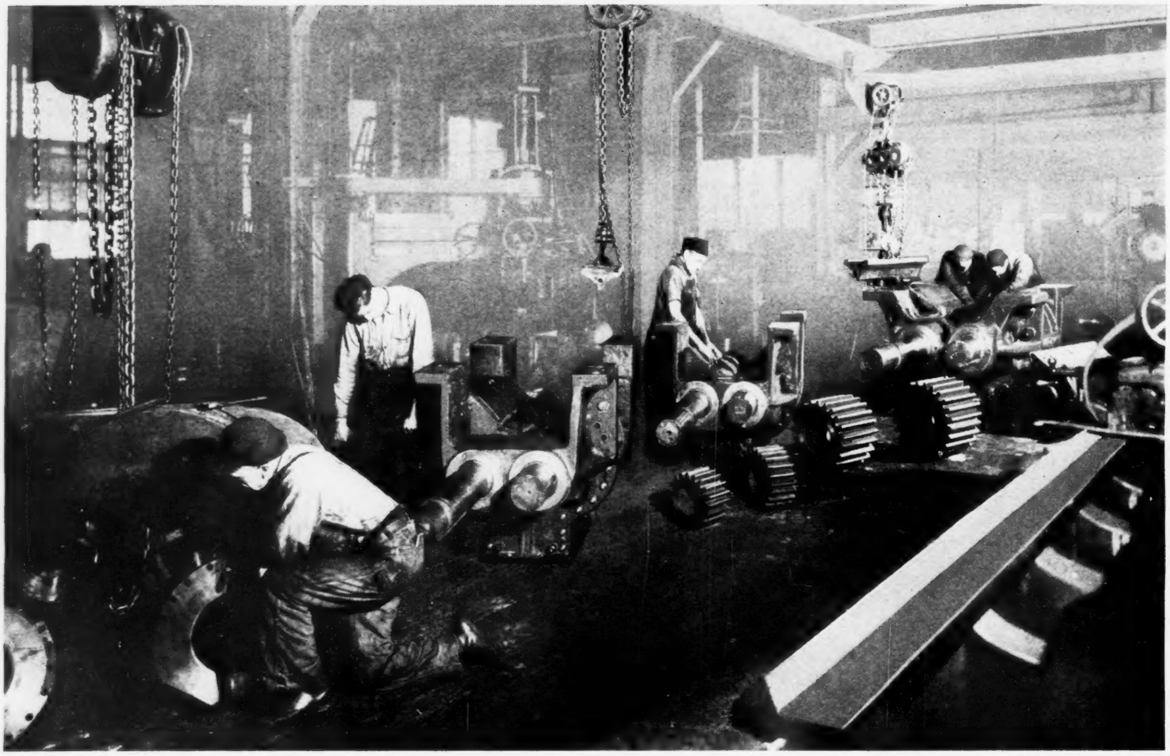
OIL





The Service That Steps Up Your Mixing Room Output

YOU KNOW increased production, faster delivery, of rubber goods *begins* in the Mixing Room, and *depends* a lot upon the condition of the Banbury equipment.

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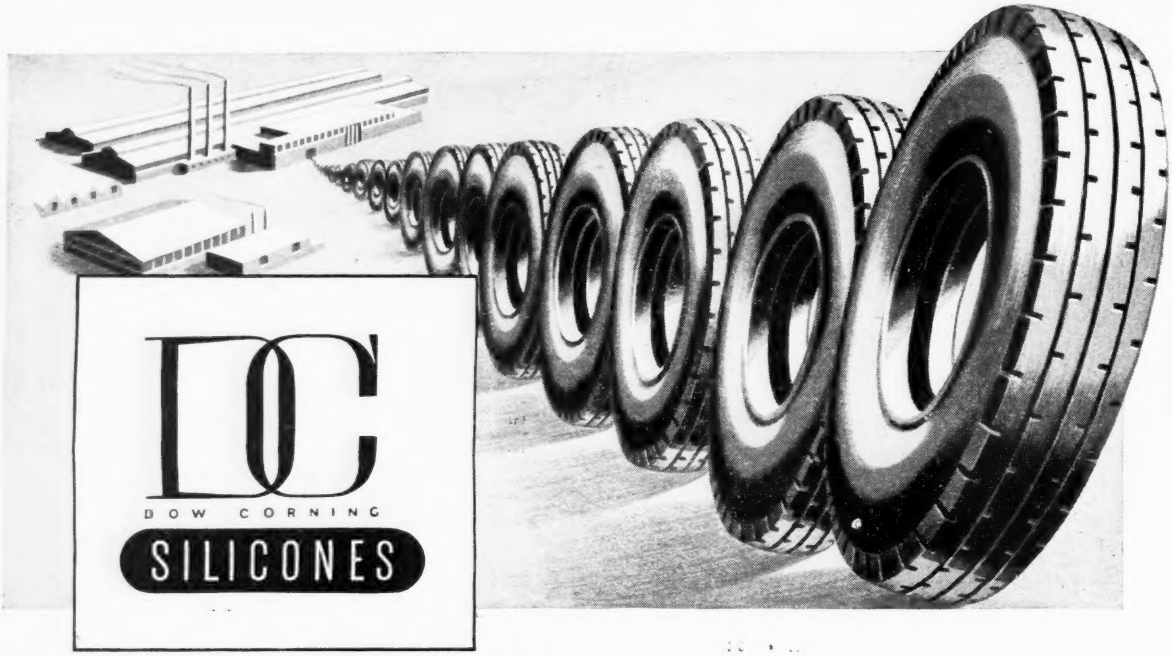
DC mold release fluid EMULSION NO. 35



Clean release—less scrap—lower production costs with this new release agent for rubber molding

Here's convenient, low-cost Emulsion No. 35 —specifically for rubber molding—that gives you clean release even when further diluted to contain as little as .25% DC Mold Release Fluid! Now you can cut finishing costs and reduce scrap with a ready-to-use emulsion. Easy to apply with spray or brush, it *does not build up on the mold*—and one application lasts for several moldings. No breaking-in period is required for new molds, and costly cleaning of old molds is eliminated. DC Mold Release Fluid Emulsion No. 35 also protects rubber from oxidation and deterioration caused by ozone. It remains colorless, too, and will not discolor white goods.

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DC Mold Release Fluid Emulsion No. 35

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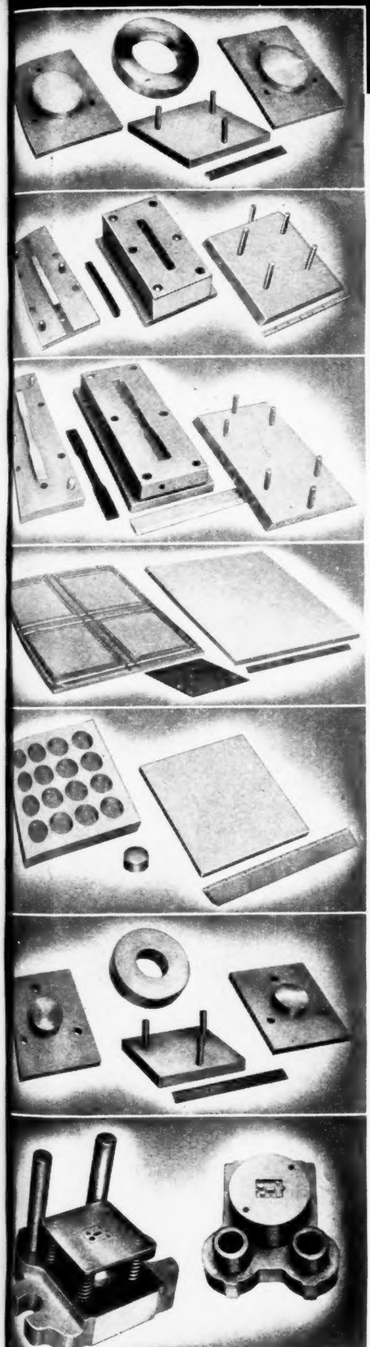

These molds are "PRECISION" Engineered for speedy operation, are durably constructed of high quality tool steel and are made to extremely close tolerances.

Cat. No.	ASTM Specifications	Purpose	Size
13450	D 429	Adhesion test disc mold—For testing adhesion of rubber to metal—Four cavity—Chrome plated	3/4" thick x 1 3/8" diameter (2 sq. in. area)
13451	D 731	Cup mold—For flow tests—Single cavity—Chrome plated	2.300" high 2.200" outside top diameter 1.750" outside bottom diameter
13464	D 395 D 531 D 676 D 297	Compression fatigue disc specimen mold—Can also be used for Compression set tests, hardness tests, resilience tests, specific gravity tests—16 Cavity—Chrome plated	1/2" thick 1.129" diameter (1 sq. in. area)
13453	D 647 Fig. 3	Dielectric strength disc specimen mold—Can also be used for Power factor tests—Single cavity—Unplated	.750" thick 4" diameter
13455	D 552	Disc specimen mold—For sponge rubber—Four cavity—Chrome plated	6" x 6" x 1/2"
13452	D 647 Fig. 3	Disc specimen mold — Can also be used for Water absorption test—Single cavity—Chrome plated	.750" thick 2" diameter
13462	D 647 Fig. 2	Flexural test specimen mold—Can also be used for Impact test—Single cavity—Chrome plated	1/2" x 1/2" x 5"
13451	D 731	Flow test mold—Can also be used for Plastics molding powders—Single cavity—Chrome plated	2.300" high 2.200" outside top diameter 1.750" outside bottom diameter
13462	D 647 Fig. 2	Impact test specimen mold—Can also be used for Flexural tests—Single cavity—Chrome plated	1/2" x 1/2" x 5"
13432		Miscellaneous mold — For rubber — Single cavity — Chrome plated	12" x 12" x 1/4"
13433		Miscellaneous mold — For rubber — Single cavity — Chrome plated	12" x 12" x 1/2"
13434		Miscellaneous mold — For rubber — Single cavity — Chrome Plated	12" x 12" x 1/8"
13435		Miscellaneous mold — For rubber — Single cavity — Chrome plated	2.5" x 1.75" x .025
13436		Miscellaneous mold — For rubber — Single cavity — Chrome plated	2.5" x 1" x .025"
13437		Miscellaneous mold — For rubber — Single cavity — Chrome plated	3" x 4" x 1/8"
13439		Miscellaneous mold — For rubber — Four cavity — Chrome plated	2" x 8" x 1/8"
14935	D 617	Punch tool—For punching quality tests (plastics)—Chrome plated	
15225	D 732	Shear tool — For testing shear strength — Chrome plated	1" diameter punch
13432		Slab mold—For rubber—Miscellaneous—Single cavity—Chrome plated	12" x 12" x 1/4"
13433		Slab mold—For rubber—Miscellaneous—Single cavity—Chrome plated	12" x 12" x 1/2"
13434		Slab mold—For rubber—Miscellaneous—Single cavity Chrome plated	12" x 12" x 1/8"
13457	D 638 Fig. 1	Tensile specimen mold — Type 1 — Single cavity — Chrome plated	1/4" thick and under
13459	D 638 Fig. 1	Tensile specimen mold — Type 1 — Single cavity — Chrome plated	1/4" to 1/2" thick inclusive
13461	D 638 Fig. 1	Tensile specimen mold — Type 1 — Single cavity — Chrome plated	1/2" to 1" thick inclusive
13460	D 638 Fig. 1	Tensile specimen mold — Type 2 — Single cavity — Chrome plated	1/4" to 1/2" thick inclusive
13458	D 638 Fig. 1	Tensile specimen mold — Type 2 — Single cavity — Chrome plated	1/4" thick and under
13467	D 638 Fig. 1	Tensile specimen mold — Type 2 — Single cavity — Unplated	1/4" to 1/2" thick inclusive
13430	D 15	Tensile specimen mold — Single cavity — Chrome plated	6" x 6" x .075"
13431	D 15	Tensile specimen mold—Four cavity—Chrome plated	6" x 6" x .075"
13463	D 647 Fig. 4	Tensile specimen mold — For dog bone tensile test specimens—Single cavity—Unplated	
13452	D 647 Fig. 3	Water absorption test specimen mold—Single cavity—Chrome plated	.750" thick 2" diameter

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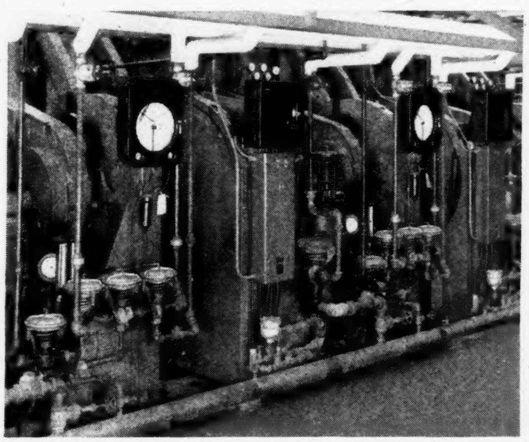
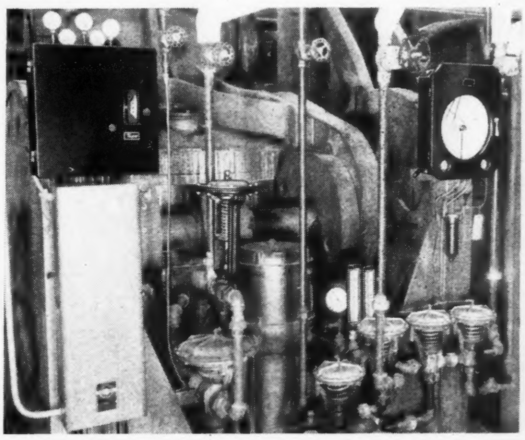
11 12 13 14 15 16 17

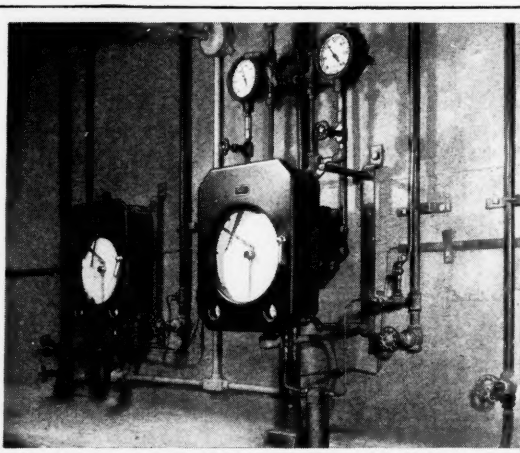
goes Rubbernecking
Rubber's new tire plant!



PART OF A LINE of the McNeil Steam Dome Presses that cure synthetic rubber tires at Eau Claire. Taylor Flex-O-Timers automatically control the sequence and duration of all functions from the closing to the opening of the press. All the operator has to do is load the press and push the button — the Taylor Flex-O-Timer does the rest.



THIS IS A CLOSE-UP SHOT of one of the McNeil Presses which produces uniform quality tires with the help of Taylor Controls. Flex-O-Timer is on the left. And on the right is the Taylor Fulscope Recording Temperature Controller which controls press temperature. It also *records* press temperatures, giving you a permanent check on operators and equipment.



ANOTHER PLACE where Taylor Accuracy is on the job. The Taylor Fulscope Recording Differential Controller (right) automatically maintains the proper differential pressure between bag water supply and return headers. The Taylor Fulscope Temperature and Pressure Controller (left) controls both the temperature and pressure of bag circulating water.

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July, 1946

Volume 114 Number 4

A Bill Brothers Publication

INDIA
RUBBER WORLD
NATURAL & SYNTHETIC

C O N T E N T S

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MARKET REVIEWS

STATISTICS

ARTICLES

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INDIA
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NATURAL & SYNTHETIC

Volume 114 New York, July, 1946 Number 4

Compounding Charts for Systems of Natural Rubber, GR-S, Reclaim, Naftolen MV, and MPC Black

Fritz Rostler[1] and Kathleen Rostler[1]

THE principal raw materials for the majority of rubber goods at the present time are natural rubber, GR-S, and natural rubber reclaim. These rubbers are known as general-purpose rubbers.

Carbon black, especially channel black, is used in the rubber industry in quantities second only to rubbers and is present in most rubber compounds.

The importance of unsaturated hydrocarbon extenders in compounding natural rubber, as well as Buna S-type rubbers, for the purpose of extending their supply and increasing the efficiency of production has been commonly known since early in the rubber shortage. It is not yet so generally realized, however, that these extenders are also valuable compounding aids for general compounding purposes. It can be predicted that this group of products will retain its place as a compounding ingredient, just as reclaim did, independent of how much or what kind of rubber is available.

The influence of these three types of compounding ingredients (rubber hydrocarbon, extender, and carbon black), individually and in combination, on the physical properties of a rubber compound was the subject of this investigation.

A considerable amount of data has been reported in the literature in specialized articles as well as in review form on compounding individual rubbers, on the properties of extenders, and on the properties of channel black. Publications dealing with blends of natural rubber, GR-S, and reclaim are fewer, but are also to be found in the literature. Prettyman,[2] for instance, has investigated various combinations with special reference to tread cracking; and Morris, Barrett, Harmon, and Werkenthin,[3] have studied the effect of substituting 20 parts of various natural rubbers in a GR-S compound.

No report could be found in the literature dealing with general characteristics of compounds based on systems comprising natural rubber, GR-S, reclaim, extender, and channel black.

[1] Engineering Experiment Station, University of Delaware, Newark, Del.
[2] Ind. Eng. Chem. 36, 29 (1944).
[3] *Ibid.*, 36, 60 (1944).

The purpose of the investigation reported in this article was to obtain information on equivalence and interchangeability of the general-purpose rubbers and on the influence of unsaturated hydrocarbon extenders and channel blacks on such systems. The object was to gain information sufficiently broad to be usable as a guide in formulation of compounds which represent the majority of rubber goods. It is believed that information on these systems, presented in condensed form, will be of interest and assistance to rubber compounders.

Scope of Investigation

The investigation was carried out by testing in series of compounds, based on one test formula, the various systems possible from natural rubber (smoked sheets), reclaim (natural rubber whole tire reclaim), GR-S, a typical extender (Naftolen MV), and medium processing channel black. The data reported in this article, although collected over a period of several years, have been correlated and combined in the form of graphs which summarize the results. The basic test formula used throughout the investigation is given below:

TEST FORMULA

Rubber hydrocarbons	100.
Sulfur	According to hydrocarbons*
Stearic acid	0.5 - 1.5†
Zinc oxide	5.0
MPC black	55.00
Naftolen MV	30.00
Benzothiazyl disulfide‡	1.50
Diphenylguanidine‡	0.25

* 3% on smoked sheets; 2% on GR-S; 1.5% on reclaim; 3% on Naftolen.
† 0.5 in series with GR-S and GR-S-reclaim combinations;
1.5 in series with smoked sheets or smoked sheets-reclaim combinations;
1.0 in series with GR-S smoked sheets or GR-S-smoked sheets-reclaim combinations.
‡ In series with natural rubber or natural rubber-reclaim, 1 part of mercaptobenzothiazole was used in place of this accelerator combination. Since only optimum cures were compared in the investigation, the two were interchangeable.

The test formula was used as a basis for series of compounds in which one investigated ingredient at a time was varied as shown in Table 1. The data from Series 1, 3, 6, 8, and 11 using Naftolen R-100 instead of Naftolen MV have been presented in detail in earlier publications.[4, 5]

TABLE 1. SERIES OF COMPOUNDS TESTED

Series No.	1	2	3	4	5
Smoked sheets	100.	—	50.	—	50.
GR-S	—	100.	—	50.	50.
Whole tire reclaim*	—	—	100.	100.	—
Sulfur	3.2-5.1	2.0-5.0	3.0-4.5	2.5-4.6	2.7-4.0
Stearic acid	1.5	0.5	1.5	0.5	1.0
Zinc oxide	5.	5.	5.	5.	5.
MPC black	55.	55.	55.	55.	55.
Naftolen MV	8.-70.	0.-100.	0.-50.	0.-70.	8.-50.
Benzothiazyl disulfide	—	1.5	—	1.5	1.5
Diphenylguanidine	—	0.25	—	0.25	0.25
Mercaptobenzothiazole	1.	—	1.	—	—

Series No.	6	7	8	9	10
Smoked sheets	100.	—	50.	—	50.
GR-S	—	100.	—	50.	50.
Whole tire reclaim*	—	—	100.	100.	—
Sulfur	3.9	2.9	3.9	3.4	3.4
Stearic acid	1.5	0.5	1.5	0.5	1.0
Zinc oxide	5.	5.	5.	5.	5.
MPC black	0.-200.	0.-150.	0.-200.	0.-200.	30.-115.
Naftolen MV	30.	30.	30.	30.	30.
Benzothiazyl disulfide	—	1.5	—	1.5	1.5
Diphenylguanidine	—	0.25	—	0.25	0.25
Mercaptobenzothiazole	1.	—	1.	—	—

Series No.	11	12	13	14
Smoked sheets	100.- 0.	—	0.-100.	0.- 50.
GR-S	—	100.-0.	100.-0.	50.- 0.
Whole tire reclaim*	0.-200.	0.-200	—	100.
Sulfur	3.9	2.9-3.9	2.9-3.9	3.4-3.9
Stearic acid	1.5	0.5	1.0	1.0
Zinc oxide	5.	5.	5.	5.
MPC black	55.	55.	55.	55.
Naftolen MV	30.	30.	30.	30.
Benzothiazyl disulfide	—	1.5	1.5	1.5
Diphenylguanidine	—	0.25	0.25	0.25
Mercaptobenzothiazole	1.	—	—	—

* Containing 50% **rubber hydrocarbon.**

Since the work reported in the present article was carried out over a period of years, variations in raw materials would falsify the picture if the data were reported as measured. In order to be able to correlate the data reported in the previous publications with the later work, characteristic compounds were selected from each series and repeated with later lots of raw materials and with Naftolen MV instead of Naftolen R-100. The curves resulting from the earlier investigations were then raised or lowered according to these repeats, and the corrected curves incorporated into the graphs. Discrepancies were found principally in the hardness of the compounds containing reclaim and in the stress-strain properties of smoked sheets compounds.[6] In order to minimize the influence of the variation in hardness of the reclaim and also of the various lots of GR-S used, the 30-second Shore hardness reading has been employed throughout.[7]

Data on modulus and elongation at break have been omitted from the figures principally because the variations in these properties between lots of reclaim or GR-S used over a period of years were greater than the variation from one compound to another in the test series, making an exact correlation meaningless. However the data measured for elongation at break and 300% modulus on the series of compounds given in Table 1 are summarized in Table 2. This summary can serve as an indication of the range in which these properties can be expected to fall.

[4] F. Rostler and V. Mehner, INDIA RUBBER WORLD, 105, 473 (1942).
[5] F. and K. Rostler, *Ibid.*, 107, 163 (1942).
[6] The tensile strength values of compounds made with prewar smoked sheets and Naftolen R-100, reported in the earlier publications, were in some cases 600 pounds per square inch higher than that of repeats made with smoked sheets from the war time stock pile.
[7] Taylor [8] has shown that 30-second readings result in the smallest error. This point holds especially for GR-S and reclaim. Smoked sheets compounds show smaller creep and are consequently less sensitive.
[8] *A.S.T.M. Bulletin*, 123, 25 (1943).

TABLE 2. SUMMARY OF DATA ON ELONGATION AT BREAK AND 300% MODULUS

Series	Rubber	Variable	% Elongation at Break	300% Modulus P.S.I.
1	Smoked sheets	Extender	700 at 8 parts extender; 760 at 70 parts extender.	1,250 at 8 parts extender; 400 at 70 parts extender.
2	GR-S	Extender	400 at 0 parts extender; 550 at 100 parts extender; Maximum of 580 at 50 parts extender.	1,890 at 0 parts extender; 220 at 100 parts extender.
3	Smoked sheets: reclaim	Extender	380 at 0 parts extender; 500 at 50 parts extender.	1,780 at 0 parts extender; 900 at 50 parts extender.
4	GR-S: reclaim	Extender	300 at 0 parts extender; 370 at 70 parts extender; maximum of 460 at 50 parts extender.	1,750 at 0 parts extender; 740 at 70 parts extender.
5	Smoked sheets: GR-S	Extender	450 at 8 parts extender; 760 at 50 parts extender.	1,670 at 8 parts extender; 380 at 50 parts extender.
6	Smoked sheets	Carbon black	760 at 0 parts black; 80 at 200 parts black; maximum of 770 at 50 parts black.	220 at 0 parts black; 1,770 at 100 parts black.
7	GR-S	Carbon black	300 at 0 parts black; 180 at 150 parts black; maximum of 570 at 55 parts black.	60 at 0 parts black; 2,000 at 100 parts black.
8	Smoked sheets: reclaim	Carbon black	530 at 0 parts black; 60 at 200 parts black.	410 at 0 parts black; 1,700 at 100 parts black.
9	GR-S: reclaim	Carbon black	320 at 0 parts black; 50 at 200 parts black; maximum of 440 at 55 parts black.	400 at 0 parts black; 1,700 at 100 parts black.
10	Smoked sheets: GR-S	Carbon black	600 at 30 parts black; 320 at 115 parts black.	450 at 30 parts black; 2,350 at 115 parts black.
11	Smoked sheets to reclaim	Rubber hydrocarbon	750 at 100 parts smoked sheets; 320 at 200 parts reclaim; Constant at 490 from 80 to 30 parts smoked sheets.	700 at 100 parts smoked sheets; 1,250 at 200 parts reclaim; constant at 1,250 to 1,300 from 80 to 0 parts smoked sheets.
12	GR-S to reclaim	Rubber hydrocarbon	570 at 100 parts GR-S; 320 at 200 parts reclaim.	700 at 100 parts GR-S; 1,250 at 200 parts reclaim.
13	GR-S to smoked sheets	Rubber hydrocarbons	570 at 100 parts GR-S; 750 at 100 parts smoked sheets; minimum of 550 at 50 parts GR-S.	700 at 100 parts GR-S; 700 at 100 parts smoked sheets; maximum of 900 at 50 parts GR-S.
14	Reclaim: GR-S to reclaim: smoked sheets	Rubber hydrocarbon	450 at 50 parts GR-S; 490 at 50 parts smoked sheets.	1050 at 50 parts GR-S; 1,300 at 50 parts smoked sheets.

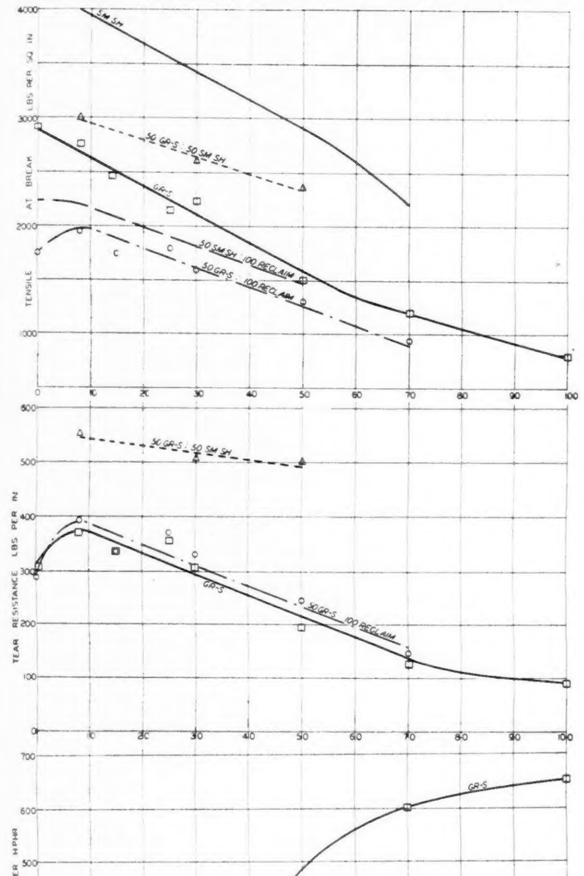

Fig. 1. Variation of Physical Properties with Extender Content

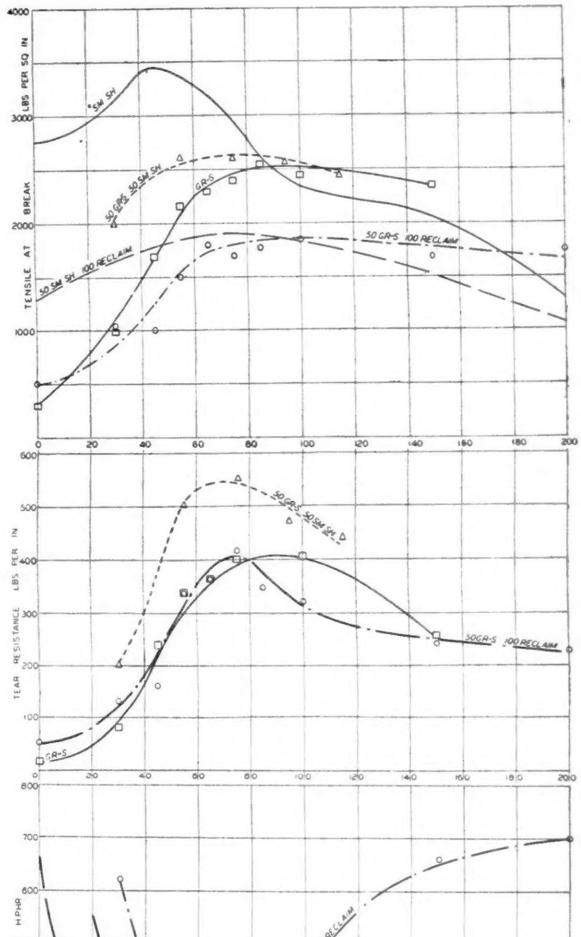

Fig. 2. Variation of Physical Properties with Carbon Black Content

Since for purposes of comparison all compounds were treated alike without consideration of specific requirements, the physical data given in this paper are in general lower than the figures which can be obtained with optimum sulfur and accelerator dosage and optimum vulcanizing conditions for each compound. Compounds were cured 20, 35, 50, 65 and 80 minutes at a steam

pressure of 45 p.s.i. (293° F.), and the optimum cure (usually 50 minutes) was selected on the basis of modulus and hardness results.

Effect of Extender Variation

Figure 1 shows the effect on physical properties of the varying extender content of the compounds of Series 1 to 5. In these and the following figures tensile strength and tear resistance were measured according to A.S.T.M. Methods D 412-41 and D 624-44; abrasion was measured on a du Pont abrader, using No. 0 emery paper, and reported as cc. loss per horsepower hour; and hardness was measured with a Shore A durometer after 30 seconds' application. Tear resistance was not measured in the first part of the investigation so that these values for smoked sheets and smoked sheets-reclaim compounds are not included in the graphs.

It can be seen from Figure 1 that with each rubber hydrocarbon the variation in properties is proportional to the amount of extender added, from eight to 60 parts, but that the extent of the effect of the extender varies from one rubber to another. This is especially true of abrasion resistance of GR-S, where the decrease in hardness (dilution of carbon black) accompanying addition of extender brings about a tremendous loss in abrasion resistance. This fact emphasizes the point which has been brought out in earlier publications[9] that with GR-S it is particularly important to compound to constant hardness by using enough extra black to offset the softening effect of the extender.

Effect of Varying Carbon Black

In Figure 2 is illustrated graphically the effect of varying channel black on physical properties shown by the compounds in Series 6 to 10. The graphs bring out the well-known fact that GR-S requires a certain minimum of carbon black for usable compounds, and that optimum properties of GR-S compounds are found at a higher black level than is the case with smoked sheets.

Effect of Varying Rubber Hydrocarbons

Figures 3 and 4 show graphically the properties of combinations of GR-S, smoked sheets, and reclaim.

Figure 3, from the data of Series 11 and 12, shows the effect of replacing GR-S or smoked sheets by reclaim. The significance of the flat part of the smoked sheets curves containing 80 to 20 new rubber hydrocarbons has been mentioned before.[5] Although a similar curve is found for GR-S as to tensile strength, the other properties measured are improved by replacement of up to 20 parts of GR-S by 40 reclaim. This improvement is primarily due to the carbon black content of the reclaim. In general, however, it can be stated for both rubbers that the first 20 parts of rubber hydrocarbon replaced by reclaim bring about the greatest change in properties.

Figure 4 shows graphically the results of Series 13 and 14, where GR-S was gradually replaced by natural rubber. The graphs for tensile and tear resistance show that mixtures containing up to 25 or 30% of GR-S differ very little from straight natural rubber compounds. Compare the 100 smoked sheets point at the extreme right with the dotted line back to 70 to 80 parts smoked sheets, 20 to 30 parts GR-S. Series 14 shows that in the compounds containing 100 parts reclaim, GR-S and natural rubber are practically interchangeable with respect to the properties reported.

[9] W. H. Grote and F. S. Rostler, *Rubber Age* (*N. Y.*), 57, 685 (1945).

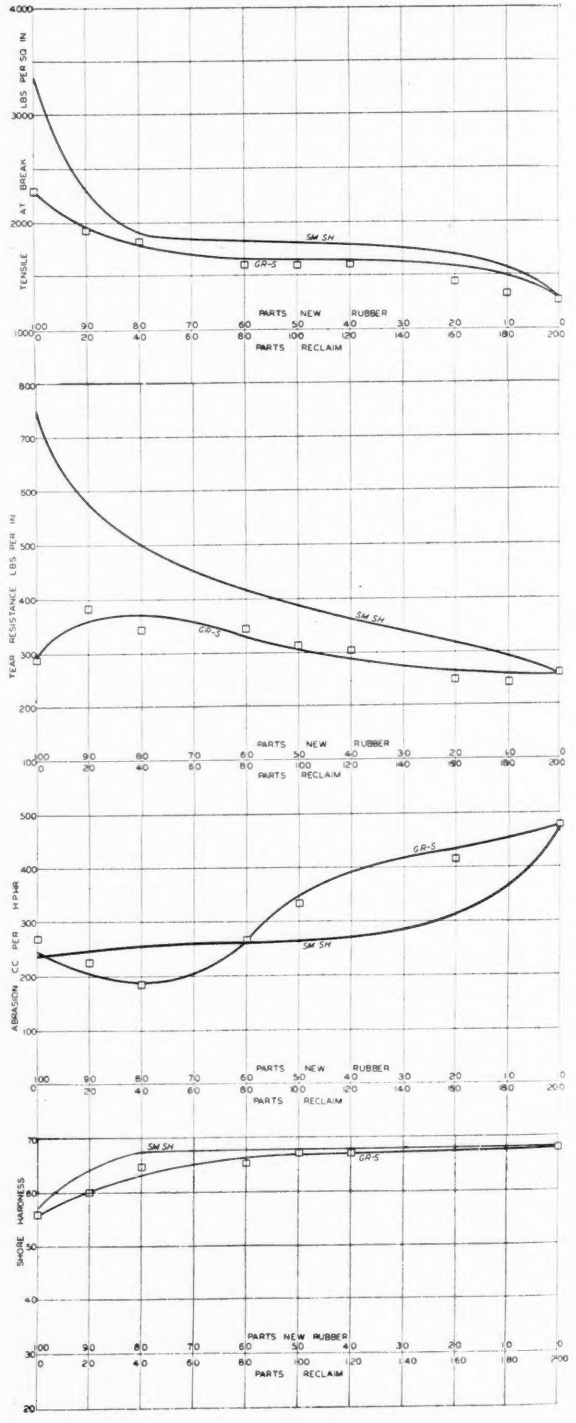

Fig. 3. Variation of Physical Properties When Smoked Sheets or GR-S Is Replaced by Reclaim

Composite Graphs

Figures 1 to 4 offer the possibility of predicting properties of combinations of the individual systems studied. These graphs can serve as a guide in setting up compounds based on the individual rubber hydrocarbons or on combinations of hydrocarbons. In some cases it might be more convenient to have a single chart depicting variations of the systems in more compact

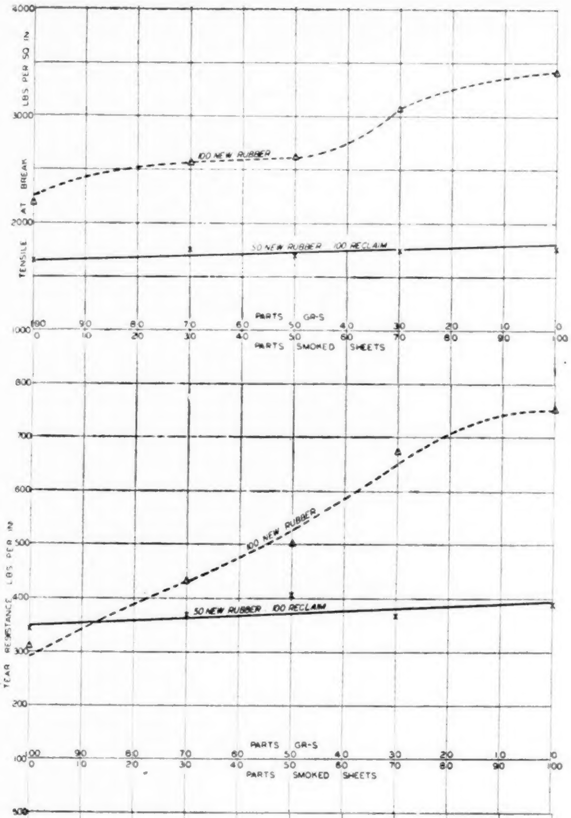

Fig. 4. Physical Properties of Smoked Sheets and GR-S Combinations

form, for example, to be able to see at a glance the combinations of hydrocarbons (rubbers and extender) which would give a particular tensile. Figure 5 serves this purpose by showing the tensile at break of all combinations of extender and rubbers in the basic test formula containing 55 parts of black. This method, which was introduced in an earlier paper,[5] is based on the fact that plotting physical properties against extender content gives straight lines in the range of eight to 50 parts of extender on 100 rubber.

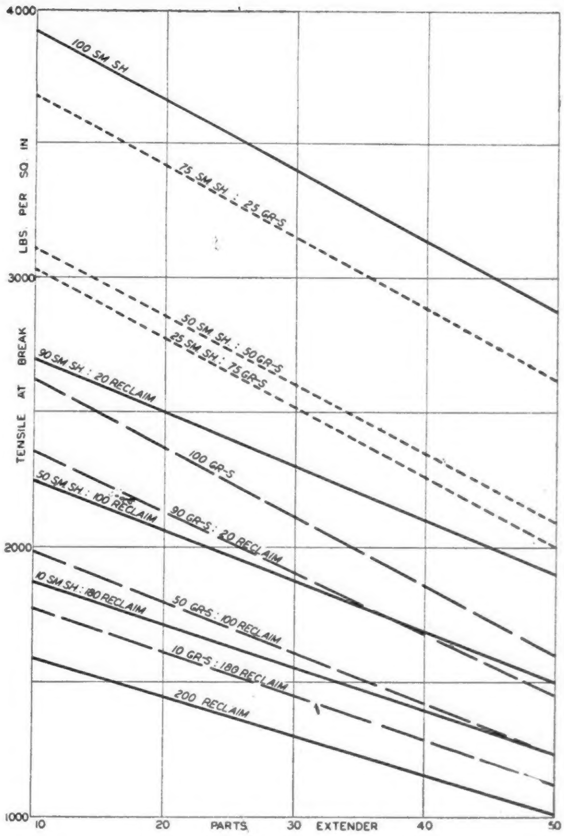

Fig. 5. Composite Graph for Tensile Strength *versus* Extender for Various Compositions

The chart shown in Figure 5 was made as follows:

The tensile values of the compounds containing 30 parts extender, taken from Figure 3, were plotted along the 30 parts extender line. The slopes of the lines for 100 smoked sheets and for 50 smoked sheets-100 reclaim were taken from Figure 1, and the lines continued to a point of convergence off the chart. The slopes of the solid lines through all the other points on the 30 extender line were found by connecting the point of convergence with the points on the 30 extender line. The 100 GR-S line was then drawn from Figure 1. Lines for the GR-S-reclaim combinations were made in the same manner after bringing the line for the 100 GR-S series to a point of convergence with the 200 reclaim line. The lines for 100 smoked sheets and 100 GR-S are, for all practical purposes, parallel. Consequently, the line for the combination 75 smoked sheets-25 GR-S was drawn parallel to the 100 smoked sheets line, and the line for the 25 smoked sheets-75 GR-S, parallel to the 100 GR-S line. The line for the 50 smoked sheets-50 GR-S compounds was drawn through the 30 extender point parallel to the 25 smoked sheets-75 GR-S line. (This line does not agree with the line for this combination in Figure 1, which has been plotted in accordance with the measured points. However the line plotted with this slope can be expected to give a better approximation for the purposes of this chart.)

The influence of the proportions of the various rubber hydrocarbons as well as of the extender can be read from this chart. Similar charts can be constructed for any other physical property. The chart does not

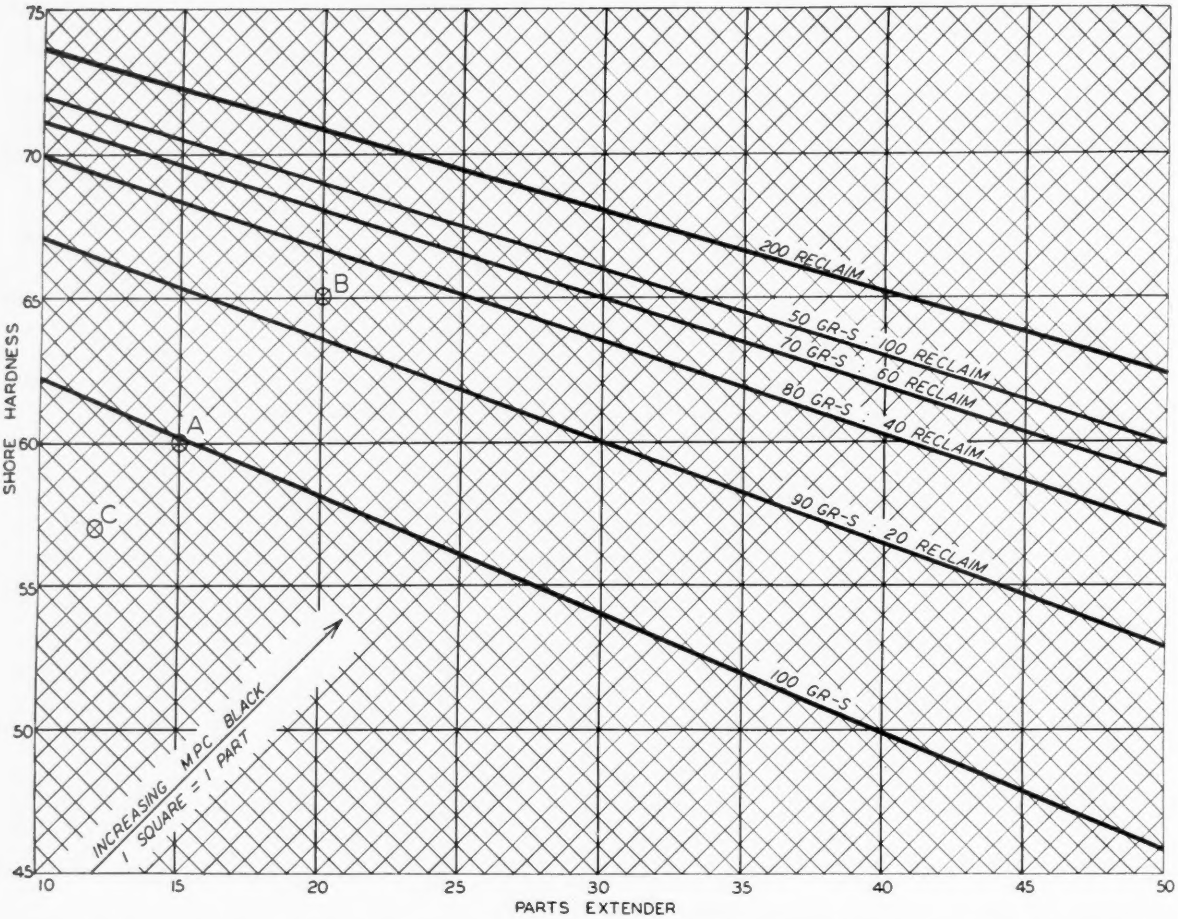

Fig. 6. Composite Graph for Hardness *versus* Extender and Including Carbon Black Variations for GR-S and Reclaim

consider the variations produced by varying the amount of carbon black.

It seems impractical to include carbon black in a figure in which the hydrocarbons are varied with the exception of a chart for hardness, which can be easily drawn as shown in Figure 6. This graph has been drawn by using a diagonal cross-section background in which each square represents one part of black.

The heavy lines represent compounds having 55 parts of black, reclaim-GR-S proportion as labeled, and varying proportions of extender. For instance, a compound containing 90 GR-S, 20 reclaim, 30 extender, and 55 black will have a hardness of 60 as found from the ordinate scale on the left of this graph. The background of the graph can be used to estimate the hardness of compounds having more or less black than the 55 parts in the base compound, by counting up or down the diagonal squares. For example, a compound containing 100 GR-S, 15 extender and 55 black would have a hardness of 60 as represented by point "A" on the chart. The same compound containing 65 parts of black would be represented by point "B" on the chart and would have a hardness of 65; a compound containing 49 parts of black would be represented by point "C" and would have a hardness of 57. It is obvious that any of these points, A, B, or C, could also have other compositions based on other reclaim, GR-S, extender, and black proportions. Point B, for example, also represents a composition of 90 GR-S, 20 reclaim, 19 extender, and 57 black. This composition is arrived at by reading down along the diagonal background line to the 90 GR-S:20 reclaim line, which it intersects at 19 parts extender. The fact that the point is two diagonal squares above the base line means that the compound contains two parts of black more than the 55 parts in the base compound.

This hardness chart could be drawn for either of the other two rubber combinations. This easily constructed chart, however, can only be made for properties such as hardness, which are linearly proportional to the black. Graphing of other properties of combinations of all the main ingredients of the base compound, including black, in one single figure would be too complicated for general compounding purposes. In order to depict all possible combinations in one graph, the graph would have to be three dimensional.

It is not difficult, however, to predict the properties brought about by carbon black variation by keeping in mind a general rule of thumb that optimum properties, e.g., highest tensile, of a compound require about 55 parts of black on all rubber hydrocarbons and about 80% black on the extender. Deviations from these proportions in both directions will give lower properties (except for hardness) in accordance with the graphs for those properties in Figure 2.

Summary and Conclusions

A series of charts has been prepared which depict

(*Continued on page* 585)

Some Technical Aspects of the Use of High-Tenacity Viscose Process Rayon in Tires[1]

W. Wycliffe Owen[2]

WHEN the generic term rayon was adopted in 1924 to designate a group of synthetic fibers produced from the basic raw material cellulose, it is doubtful whether any of those concerned had even the faintest dream that within two decades rayon would play a major role in winning a second World War. Yet it has been stated repeatedly by those in the tire industry that it would not have been possible to produce serviceable heavy-duty tires for gun carriages, trucks, buses, and airplanes from GR-S without rayon cord.

While cellulose may be converted to rayon by any one of four different processes—viscose, cuprammonium, acetate, or nitrocellulose—only the viscose process has been used for high-tenacity tire yarn. This yarn has about twice the strength of regular textile rayon.

The Viscose Process

The viscose process is unique and differs from most chemical processes in that the final product is chemically the same as the initial raw material. All of the numerous operations involved are with the major objective of converting short cellulose fibers into continous filaments. During the course of this conversion there are opportunities to effect some improvements over Mother Nature and to "tailor" the resulting fiber to meet the requirements of certain specific applications.

In the viscose rayon process, sheets of highly purified cellulose, from wood pulp or cotton linters, are steeped in an 18 to 19% solution of caustic soda and pressed to remove the excess caustic solution. The resulting alkali cellulose is shredded to break up the densely pressed material into a loose, fluffy mass of fibers. This shredded alkali cellulose is aged in closed metal containers to reduce the degree of polymerization of the cellulose to that suitable for the process. It then is treated with carbon disulfide to form sodium cellulose xanthate which, in turn, is dissolved in a solution of 6% to 8% caustic soda. The resulting solution is quite viscous and is known as viscose.

As soon as the xanthate is dissolved to form viscose, a slow process of hydrolysis, referred to as ripening, begins during which carbon disulfide groups are split off, and cellulose is reformed. As viscose ripens, the ease with which it may be coagulated with an electrolyte becomes greater. Air which has been entrapped during mixing is removed from the viscose by evacuation. The solution is filtered several times to remove all insoluble or foreign particles which later might cause difficulties during the spinning operation.

Upon completion of the ripening process, viscose is pumped to a spinning machine. It is forced by a small metering pump through a spinnerette into an acid coagulating bath in which the viscose is coagulated and cellulose regenerated to form rayon. In a spinnerette is a given number of holes, each approximately 0.003-inch in diameter, through which viscose is forced to form continuous individual filaments.

The filaments from a single spinnerette are converged into a bundle to form a thread. Each of these continuous filaments of tire rayon may be many miles in length, but only about 0.0007-inch in diameter. They are so fine that 2,600,000 filaments would be contained in a cross-section one square inch in area.

During its passage through the bath to a windup device the bundle of parallel filaments of high-tenacity rayon is stretched by the application of high tension.

While there are a number of factors in this series of operations which have far-reaching effects on the character of the final product, this stretching operation is one of extreme importance. It seems to be a fundamental principle that the strength and modulus of a fiber, whether steel, silk, nylon, rayon, or some other substance, may be materially enhanced if work is performed on it by stretching. It is necessary that this operation, which orients the internal structural elements of each filament, be performed in such a manner that the increased strength is incorporated as a permanent property which is not lost upon subsequent relaxation. It is during the spinning operation that high strength is built into tire rayon.

After spinning, the yarn is washed thoroughly to remove residual acid, dried, and wound into a package for shipping. There is a trend in the rayon industry toward combining the spinning, washing, and drying operations into a continuous process. Because the manufacture of viscose rayon is a chemical process, it is possible to maintain continuous production of yarn quite uniform in properties as contrasted with those fibers which are at the mercy of the whims of Mother Nature.

The size of rayon yarn is measured in terms of denier, which can be defined as the weight in grams of a 9,000-meter skein. The relation between denier and cotton count, with which most of those in the rubber industry are familiar, is as follows:

$$\text{Denier} \times \text{cotton count} = 5314.9.$$

High-tenacity rayon or tire rayon, as compared with regular textile rayon, is characterized by its high tenacity, low elongation, and resistance to fatigue. Tenacity is expressed as strength per unit weight, grams per denier, rather than total breaking load, as follows:

$$\text{Tenacity, g.p.d.} = \frac{\text{Total breaking load in grams}}{\text{Denier of yarn}}$$

A comparison of typical physical properties of regular textile and tire rayons is given in Table 1.

TABLE 1. PHYSICAL PROPERTIES OF TYPICAL VISCOSE RAYON YARNS

	Regular Textile Rayon (Range)	Tire Rayon (Range)
Denier	40 - 900	275 - 2200
Number of filaments	14 - 150	120 - 960
Conditioned tenacity, g.p.d.	1.7 - 2.0	3.2 - 4.0
Conditioned elongation, %	17 - 25	9 - 11
Wet tenacity, g.p.d.	0.7 - 1.0	1.9 - 2.3
Wet elongation, %	23 - 30	18 - 21
Loop tenacity, g.p.d.	1.5 - 1.9	2.4 - 2.9
Loop elongation, %	14 - 20	6 - 8

Tire yarn has approximately twice the strength of textile yarn and about half the elongation. Its wet

[1] Presented before Chicago Rubber Group, Mar. 22, 1946, and rewritten especially for INDIA RUBBER WORLD.
[2] Rayon division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

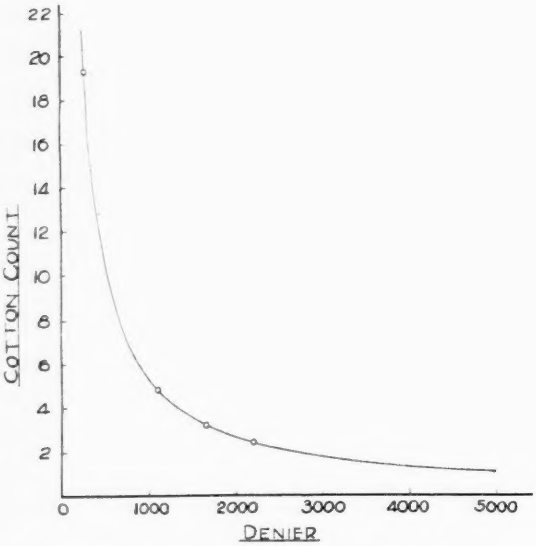

Fig. 1. Relation between Denier and Cotton Count

Denier=Weight in Grams of 9000 Meter Skein
Count=Number of 840-Yard Skeins per Pound
Denier × Count = 5314.9

Denier	Count	Yd./Lb.
275	19.33	16,325
1100	4.83	4,059
1650	3.22	2,706
2200	2.42	2,029

strength is about 60% of its dry strength. Loop tenacity, the tenacity obtained when one end of yarn is looped through another so that each end is bent 180 degrees on a very small radius around the other end of yarn, seems to be an indication of the toughness of a yarn, or its ability to withstand repeated flexing.

The value for tenacity of tire yarn may be of little significance to those who have had no reason to deal with this term of strength. It is equivalent to a tensile strength of about 75,000 pounds per square inch, the strength of mild steel.

Currently the tire industry is using rayon yarns of four sizes, 275, 1100, 2200, and within the past few months, 1650 denier. These yarns, as shown in Figure 1, are equivalent to 19.33/1, 4.83/1, 2.42/1, and 3.22/1 cotton count, respectively.

Following a research and development period of about six years, the du Pont company introduced "Cordura" tire rayon in 1934 with a total production of 5,400 pounds for the year. The first plant built to produce rayon tire yarn started operations in 1936, during which only 336,000 pounds were produced. The data in Figure 2 demonstrate how the rate of production increased several hundred-fold over a 10-year period to 193,900,000 pounds in 1945. The unusually large increases beginning in 1943 largely resulted from loss of the supply of natural rubber followed by the use of GR-S, with which each member of the rubber industry is quite familiar.

Because of the higher operating temperatures developed in heavy-duty tires made of GR-S, rayon cord, which maintains a much greater portion of its strength than cotton at elevated temperatures, became an essential and critical war material.

The annual productions of viscose and cuprammonium continuous filament yarn and total productions of all rayon, continuous filament and staple, also are given in Figure 2.

Conversion of Yarn to Cord

The yarn produced by a rayon manufacturer must be twisted into cord before it is suitable for use in tires. This yarn, which may contain zero to three turns per inch twist, normally is supplied as a beam weighing 900-1,000 pounds, on which there may be from 100 to 200 individual and parallel ends of yarn. The beam usually is mounted above a conventional ring twisting machine, as shown in Figure 3. Depending upon the denier of yarn and cord construction desired, twist may be inserted in each single end of yarn, or two or more ends may be plied and twisted as yarn is wound from the beam on to spools.

The twisted yarn is converted into tire cord by twisting together two or more ends, normally in the direction opposite to that used for the yarn. The direction of twist in yarn or cord is designated either as "S" or "Z" twist, formerly referred to as "left" or "right," respectively. A yarn has "S" twist if, when held in a vertical position, the spirals conform in slope to the central portion of the letter "S"; similarly, a yarn has "Z" twist if the spirals conform in slope to the central portion of the letter "Z."

Frequently cord is rewound from twister spools to larger packages which are charged on to a creel. Cords pass from the packages on a creel into a loom to form the warp of the tire fabric. Weaving of this fabric is rapid since only one pick to four picks per inch of about 30/1 cotton yarn are inserted. This fabric is wound into 500-1,000-yard rolls for shipment to the tire manufacturer.

During the twisting and weaving operations, it is essential that relative humidity of the area and tensions on the yarn and cord in each step of the operation be properly controlled in order that the resulting cord and fabric be uniform in quality and in physical properties.

Continued improvements in the character and physical properties of yarn have been the underlying reason for

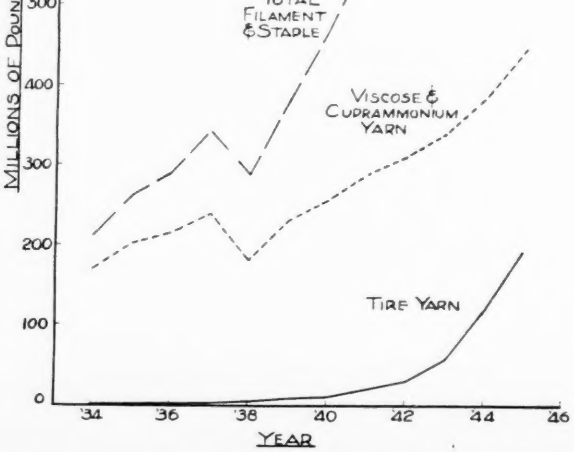

Fig. 2. Production of Rayon

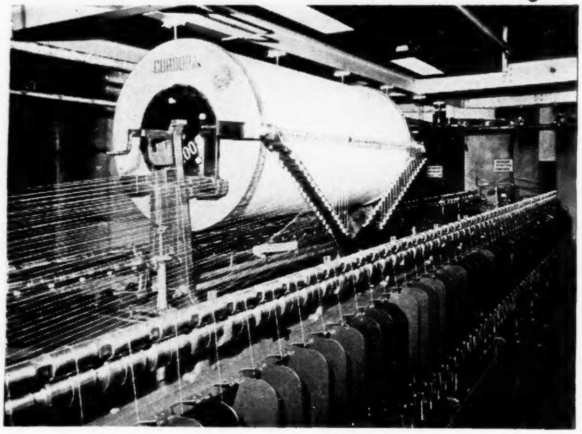

Fig. 3. Ring Twisting Machine for Rayon Yarn

a rapid evolution in rayon tire cord constructions over a 10-year period. Initially 275 denier was chosen for tire yarn because it was about the size of 21/1 cotton yarn which was widely used by the industry in tire cord. Also, 275/5/3 cord construction first was used because it was similar to that of cotton cord. As experience was gained with this new material of construction and yarn was improved, cord structures progressively were simplified to a 275/4/2 construction. In about 1938 the structure of rayon cords was simplified further with the introduction of 1100 denier yarn from which 1100/2 cord was constructed.

This construction was used almost universally until 2200 denier yarn was introduced in 1944. By using 2200/2 cords, the industry was able to realize a substantial increase in tire production without additional equipment at a time when the Army's need of tires was extremely critical. Within the past few months there has been considerable interest in the possibilities of rayon cord having a 1650/2 construction.

In selecting the twist to be used in each component of a tire cord structure, it is essential that strength, elongation, and fatigue properties be balanced. Some of the constructions used for tire cords are diagrammed in Figure 4.

For two-ply cords, twist first is inserted in the singles yarn; then two ends are plied by twisting in the opposite direction. For 1100/2 cord, from 12 to 17 t.p.i. twist may be used in the singles and 10 to 14 t.p.i. in the cord; while 9 to 12 t.p.i. in the singles and 8 to 12 t.p.i. in the cord may be used for 2200/2 cord. The use of 1650 denier yarn is so new that no twist constructions are available. However it seems evident that they will be intermediate between those for 1100/2 and 2200/2 cords.

Because of currently insufficient production of 2200 denier yarn, the practice of "folding" or plying two ends of 1100 denier yarn during the initial twisting operation is being followed in the production of 1100/2/2 cord. This cord may be of either cable, Z/S/Z, or hawser, Z/Z/S, construction. Generally speaking for the same number of turns twist in each cord component the cable construction is believed to have slightly higher strength and lower elongation; while the hawser construction has better fatigue resistance.

The range of physical properties of some typical 1100/2 tire cords given in Table 2 demonstrates that about 80% of the conditioned yarn strength was converted into cord strength. The oven-dry properties of tire cord are of considerable significance because generally it is believed that cord in tires in service normally has low moisture regain. It is of particular interest, then, that the oven-dry strength of rayon tire cord is about 20% greater than its conditioned strength.

TABLE 2. PHYSICAL PROPERTIES OF TYPICAL RAYON TIRE CORDS

Construction	1100/2
Twist—Singles, t.p.i	15Z
Cord, t.p.i.	11S
Conditioned Cords—12% Moisture Regain	
Denier	2450
Breaking load—lb.	14-16
Tenacity—g.p.d.	2.6-3.0
Elongation—at 10 lb. load, %	7-9
At break, %	12-15
Oven-Dry Cords	
Breaking load—lb.	18-19
Tenacity—g.p.d.	3.3-3.6
Elongation—at 10 lb. load, %	3-4
At break, %	9-11

The construction and properties of tire cords only have been discussed in detail. There is, however, a wide range of twist constructions which may be used in designing cords for specific applications in other fields. Through the use of low twist constructions, it is possible to produce higher modulus cords having higher strength and lower elongation, with yarn to cord strength conversions as high as 95 to 100%.

Processing of Cord into Tires

During the earliest stages of the development of tire rayon it was recognized that rubber would not adhere to rayon cord. Upon close examination it will be found that a rayon cord is a smooth, twisted bundle of 980 to 1960 continuous filaments quite similar in structure to that of a steel cable. There is no multitude of fiber ends protruding to assist in its adhesion to rubber. Also, it has no natural or inherent affinity for either natural or synthetic rubber. Consequently rayon tire fabric must be treated with an adhesive in order that rubber will adhere to it both during its processing and while it is in service in a tire. Incidentally, several tire manufacturers now treat their cotton cord with an adhesive.

The relatively inexpensive resorcinol-formaldehyde-latex adhesive, which provides an excellent rubber to cord bond, was developed. Subsequently other types of

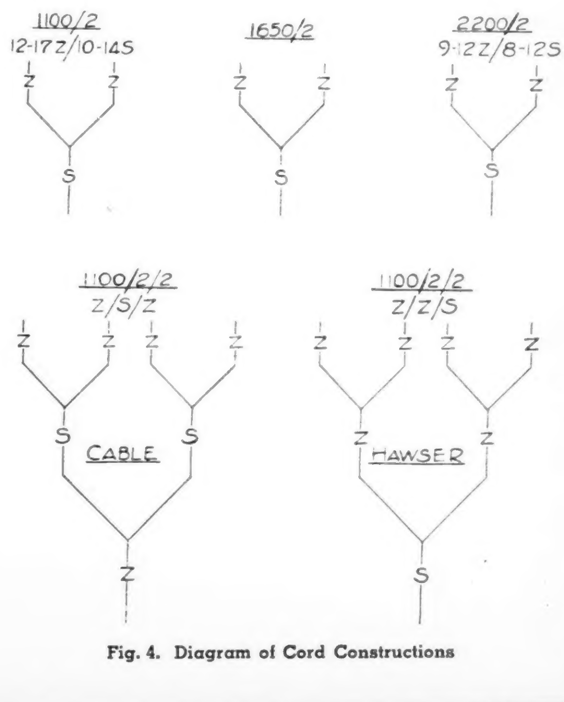

Fig. 4. Diagram of Cord Constructions

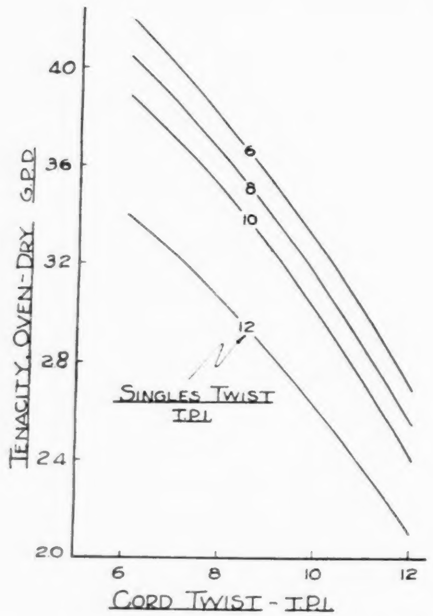

Fig. 5. Effect of Twist on Oven-Dry Tenacity, 2200/2 Cord

adhesives which are generally satisfactory and of lower cost have been developed and are being used by some in the industry. Normally, adhesives are applied to tire fabric as aqueous dispersions.

Because rayon cord will contract if wet while in a relaxed state, it is essential that sufficient tension be applied to fabric during dipping and subsequent drying to prevent undue shrinkage. Generally efforts are made to obtain the same yardage of treated fabric as was in the untreated roll. The application of tension during the period when fabric is immersed in the solution also has the desirable effect of inhibiting penetration of adhesive into the cord structure to any appreciable depth. Unless cord fabric is prevented from shrinking during dipping and drying, there will be a loss of tenacity and an increase in elongation of the cords.

Following the treating operation, it is necessary that the fabric be dried to a moisture regain of about 2% or less before rubber is calendered on to each surface. This low regain should be maintained during the interval between this operation and that of tire building to prevent separation difficulties during and immediately after curing of tires. Also, there are some indications that excessive carcass growth may result if low regain is not maintained in the fabric through the tire curing operation.

Plies, cut on the bias from the calendered fabric, are built into a tire. The tire is formed and finally vulcanized in a steam-heated mold.

Significance of Physical Properties

The many steps in the history of rayon tire cord have been followed, from the raw material, cellulose, to the finished product in a cured tire, in order to develop a background for the rest of this discussion. Returning to the subject of yarn properties, it is extremely difficult to forecast the properties of a cord from data on yarn only. As a rough approximation, the combination of high conditioned tenacity, low conditioned elongation, and high loop tenacity is desirable. Certain predictions may be made based on experience, but it is necessary to twist and test cords from a given yarn in order to determine whether it may be suitable for use in a cord structure.

What determines the suitability of a cord for use in tires? Certain information obtained by means of physical tests enables one to make a preliminary evaluation of a cord. Additional information regarding cord performance may be developed by wheel tests on tires; but in the final analysis it is only by making road tests on tires containing the cord that the complete answer to this question can be obtained.

Those cord properties which are most significant from a quality and performance standpoint are strength, elongation, and resistance to fatigue or flexing. The twist construction for a tire cord, as previously pointed out, is selected to obtain a balance between these properties. The relative importance assigned to each of these properties by different tire engineers varies to a limited extent because of differences in theory of tire design. However, as in the design of any load-bearing structure, strength of the individual elements, or cords, is a critical factor in designing a tire carcass. The manner in which tenacity of 2200/2 cord may vary with singles and cord twist is demonstrated in Figure 5. These data show that as twist was increased in both the singles yarn and cord structure, cord tenacity decreased.

Closely associated with strength are denier, or yards per pound, and gage. Because of its superior strength per unit weight and per unit gage, a carcass built of rayon cord is much thinner and lighter in weight than one of equivalent strength from cotton. Generally, the thickness of a rayon carcass is 70 to 75% of that of a comparable cotton carcass.

It is an accepted fact that the behavior of rubber under tension is quite different from that in a relaxed state. If the tread of a tire in service is under tension, its rate of wear is accelerated. If the tension is too high, the tread stock ultimately will crack, which condition may render the tire useless immediately or materially reduce its service life. It is, therefore, desirable that tire cord have as low elongation as possible in order to reduce to a minimum carcass growth and the resulting tensions which may be developed in the tread stock.

When a tire is first inflated, it increases in size, both circumferentially and in cross-section, as cords in its carcass stretch under the applied load. This condition seems to be due primarily to "soft stretch" or mechanical elongation as each cord structure is loaded and compacted. As a tire is operated in service, there is a

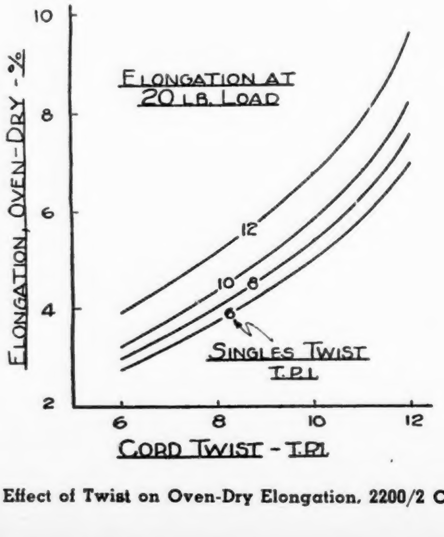

Fig. 6. Effect of Twist on Oven-Dry Elongation, 2200/2 Cord

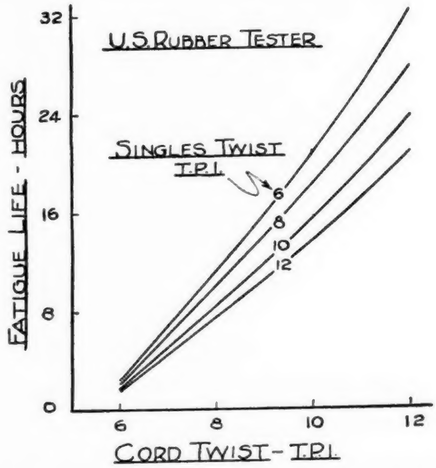

Fig. 7. Effect of Twist on Fatigue Life, 2200/2 Cord

further slow increase in size which is believed to be due largely to "creep" of the filaments themselves. The mechanism of tire growth is much more complex than these simple statements indicate and is beyond the realm of a rayon technician. However there are certain controllable factors, such as cord twisting conditions and tensions during treatment of fabric with an adhesive, which are known to affect materially cord elongation and carcass growth. The data in Figure 6 indicate that as singles twist and cord twist of 2200/2 cords were increased, elongation at 20-pound load also increased.

It is a relatively simple matter to produce a yarn which may be converted into a cord having high strength and low elongation, but this is not enough. The resulting cord must be capable of withstanding millions of flexings under the service conditions to which a tire may be subjected.

Each time a tire in service makes one revolution, every cord in the carcass is bent, or flexed, alternately under tension and compression. The degree of flexing depends primarily on tire design, load, inflation pressure, and highway surface. If a tire always is properly inflated and carries no more than its normally rated load, the effect of this flexing usually is not serious. However either overloading or under-inflation results in intensified cord stresses in the shoulders, that part of the carcass directly under each edge of the tread.

Unless a cord is made from what might be termed a "tough" yarn, these alternately applied compression and tension stresses will result in premature failure of cord from fatigue. While the construction of a cord has a profound effect on its fatigue resistance, the determining factor is the inherent fatigue characteristics built into the rayon yarn itself.

The term fatigue is easily defined, but evaluating the fatigue resistance of tire cord is not a simple matter. Several types of cord fatigue testers, none of which appears to duplicate the complex stresses which occur in a tire in service, are in use in the tire industry. These testers are of great value as research and development tools for their results usually can be correlated with tire performance of cords from a given type of yarn. However it is universal practice to follow laboratory tests with tire tests in the final evaluation of a given type of cord for its fatigue resistance.

The results of a study of the effect of twist on fatigue resistance of 2200/2 cords, as measured by the U. S. Rubber type of fatigue tester, are plotted in Figure 7. These data indicate that fatigue resistance improved as singles twist decreased and cord twist increased. There seems to be a minimum twist construction for each type of cord structure below which fatigue resistance in actual tire tests falls off quite rapidly, but which may not be reflected in the results of laboratory fatigue tests. This is believed to be due to the effect of compression forces which are not involved in most types of fatigue testers.

The cord properties which primarily are of economic significance are strength, denier, or yards per pound, and gage. Strength actually is a commodity. The tire manufacturer wants to purchase the greatest amount of strength per pound of cord. For a given breaking strength, any decrease in denier, or increase in yardage per pound, is a distinct economic advantage.

The gage of cord determines the maximum number of ends per inch which may be used in tire fabric and the amount of rubber required during the calendering operation. It also directly affects the thickness of a carcass. For heavy-duty tires every effort is made to reduce carcass thickness as much as possible without making any reduction in its strength. Thus tenacity per unit gage is a critical economic factor in tire design.

Some interesting properties of rayon cord best can be illustrated in a comparison with cotton cord, which has been used in tires over a period of about 30 years. The physical properties in Table 3 were obtained on cotton cords which were reported by the suppliers to be representative of those used by the tire industry. Conditioned cotton cord tenacities are somewhat lower than those of rayon; oven-dry tenacities are much lower; and tenacities at 300° F. are only a fraction of those for rayon.

Table 3. Physical Properties of Rayon and Cotton Cords

	Commercial Cotton Cords				Representative Rayon Cords	
Construction	22/5/3	17/4/3	16/4/3	13/3/3	1100/2	2200/2
Conditioned Cords						
Moisture regain—%	6.4	6.4	6.4	6.2	12.0	12.0
Denier	4319	4632	5131	4280	2440	4830
Breaking load—lb.	20.0	20.8	21.1	17.7	15.6	32.0
Tenacity—g.p.d.	2.10	2.04	1.87	1.88	2.90	3.00
Elongation—at 10-lb. load, %	5.4	5.4	5.3	7.2	8.0	7.0*
At break, %	9.4	9.7	10.7	12.3	14.0	12.8
Oven-Dry Cords						
Breaking load—lb.	19.6	19.5	19.9	16.1	18.8	38.3
Tenacity—g.p.d.	2.06	1.9	1.76	1.71	3.50	3.60
Elongation—at 10-lb. load, %	2.6	3.2	2.9	3.1	3.8	4.0*
At break, %	5.2	5.4	5.0	5.1	10.5	10.0
Cords at 300° F.						
Breaking load—lb.	11.1	10.2	12.3	10.3	14.8	30.3
Tenacity—g.p.d.	1.17	1.00	1.09	1.09	2.75	2.84
Elongation—at 10-lb. load, %	10.7	10.7	10.7	10.7	11.0	10.5*

*Elongations at 20-pound load.

Expressing these data on the basis that the condi-

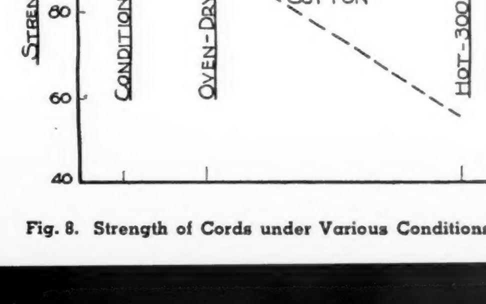

Fig. 8. Strength of Cords under Various Conditions

tioned tenacity of each cord is 100%, the curves in Figure 8 illustrate the manner in which average tenacities of rayon and cotton cords changed with conditions. Rayon cord tenacity increased about 20% when dried, while cotton lost about 6% of its tenacity. When the temperature was increased to 300° F., the loss for rayon cord was only 5% of its conditioned tenacity, while the loss for cotton was about 44%.

Expressing these same data in a different manner in Figure 9, rayon's conditioned tenacity was 50% greater than that for cotton, its oven-dry tenacity 91% greater, and its hot tenacity 157% greater.

Uniformity is a cardinal virtue for any raw material. Rayon yarn, because of the controls which may be imposed upon a chemical process, is relatively uniform in cross-section, in denier, and in physical properties. As a result, rayon cords of highly uniform physical properties may be fabricated from the yarn. This is of considerable practical value because of the resulting higher "effective cord strengths" which may be utilized for carcass design.

As an example, every tenth cord across sections of rayon and cotton tire fabric was tested. The resulting distribution curves of values of elongation at 10-pound load in Figure 10 illustrate the superior uniformity of rayon cord.

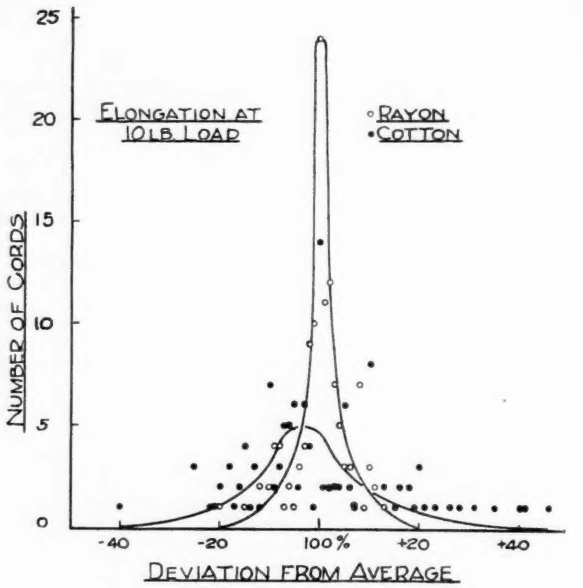

Fig. 10. Distribution Curves for Elongation

Summary and Conclusions

In conclusion, those properties of rayon tire cord which have resulted in its universal use in heavy-duty tires, which range in size up to about 114 inches in diameter, with a 36-inch cross-section diameter and as many as 34 plies, may be summarized.

The higher tenacity per unit gage of rayon cord enables the tire manufacturer to produce truck, bus, airplane, and earth-mover tires which are appreciably thinner and lighter in weight and which have higher carcass strength, higher impact bruise resistance, and much greater strength at high temperatures than would otherwise be possible. Such tires are more dependable and will withstand a larger number of retreading operations.

Reduction in thickness of a carcass has a two-fold advantage. It has been estimated that about 6% less rubber is required than for a tire of equivalent strength reinforced with cotton cord. Heat which is developed within a tire carcass due to flexing has a shorter distance to travel and is dissipated more rapidly so that internal tire temperatures are appreciably lower. Some tests indicated that each 1/32-inch increase in tire thickness resulted in a temperature rise of 5° F. Thus the likelihood of carcass failure due to heat generated under severe service conditions is lessened, and there is an increase in tread life.

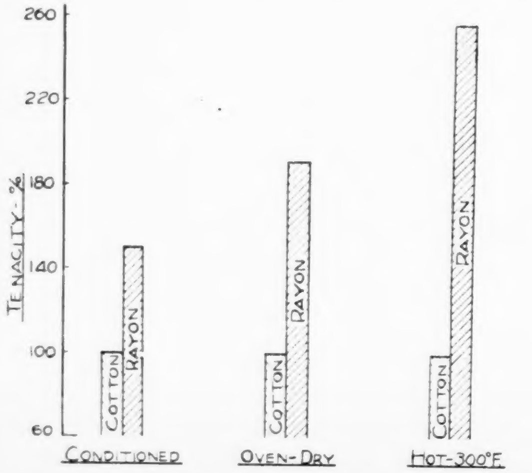

Fig. 9. Relative Cord Strengths under Various Conditions

Rayon tire cord played a major role in helping win the war primarily by making it possible to manufacture a thinner tire which would operate at a lower temperature and which was less susceptible to heat failure. This was a major contribution toward the conservation of our meager supply of natural rubber and the reduction in consumption of synthetic rubber.

It is of considerable economic importance that the price level of rayon has been stabilized over a fairly long period, which is quite a contrast with those of other commodities. As a result, rayon may be purchased with much greater confidence, and the necessity of large inventories or purchases in a future market is eliminated.

A major objective of the rayon technician is to continue to improve characteristics of yarn which will permit further reductions in twist constructions of tire cords, but without loss of fatigue resistance, in order to utilize a greater portion of the inherent yarn strength in the conversion to cord structures.

This discussion has been confined to the use of rayon in tires because it is in this field that the largest background of experience has been developed. It should be emphasized, though, that high-tenacity rayon is a versatile fiber and that there is a wide range of cord constructions in which it may be used. Its physical properties suggest a number of applications in the field of mechanical rubber goods which undoubtedly will be explored in the near future.

"Catalog of American Standards." American Standards Association, New York, N. Y. 24 pages. This latest catalog lists the titles of current standards and their prices. With regard to rubber, there are five standards on methods of test, and individual standards on rubber gloves, linemen's protective equipment, matting, mills and calenders, and insulating tape.

Recent Russian Literature on Natural and Synthetic Rubber—XXII

M. Hoseh

CEMENTING Properties of NK and SK as Determined by Their Cohesive and Adhesive Forces. N. A. Krotova, *Kauchuk i Rezina*, 8, 28-37 (1940). **SN-96.**

The factors which determine the cementing properties of a rubber cement are its cohesion and adhesion. It is to be expected that these properties will differ for NK and SK because of basic differences in the structure of these materials. The structure of NK is regular; thus such phenomena as aggregation and orientation are facilitated. The double bonds which impart to some extent polarity are located in NK along its axis. Unlike NK, SK has a branched molecule. This is caused by the formation of active centers (during polymerization) not only at the ends of the chain, but also in its various parts. SK is also considerably shorter than NK. Finally, the molecular structure of divinyl (parent material of SK) is $CH_2{:}CH{\cdot}CH{:}CH_2$; whereas that of isoprene, the basic unit of NK, is $CH_2{:}\underset{CH_3}{C}{\cdot}CH{:}CH_2$. The presence of methyl groups in NK is likely to exert great influence on the properties of the cement.

The comparative study of the properties of cements of NK and SK was made by investigating the structural changes which a film of cement underwent under the influence of changing temperature. The effect of these changes was studied on the strength and the nature of damage done, such as layer separation, tearing, etc. Also, the behavior of these two rubbers in solution was studied. Purified xylene as solvent was used. In determining the surface tension on the rubber solution-air interphase, NK in small concentrations (up to 0.7%) lowered the surface tension. As the concentration increased, NK had no effect on the surface tension. SK did not change the surface tension of the solvent. In their effect on the surface tension of the solvent purified and unpurified rubber behave similarly.

Films of NK and SK cements were deposited on gelatin and investigated roentgenographically. The roentgenogram produced by the NK showed some evidence of orientation. No such orientation was observed on the roentgenogram produced by SK. A curve was drawn from the experimental results on the effect of temperature on the viscosity and elasticity of cement films. On this curve is a region in which the relation between the components of elasticity and viscosity is constant. This region corresponds to the rubbery state of the cement. The region has two delimiting points which are actually transition points; one of them is the transition point to a "frozen" state, and the other is the transition to a semi-liquid state. On the temperature curve are distinguishable several regions corresponding to a complete break of the cement film from the base, a mixed break and a layer separation region. The substance on which the strength of adhesion of the cements was studied was the fleshing and the face sides of leather. The adhesion strength of NK cement was different for the fleshing than for the face side. No such difference was observed for SK cements. The lower adhesive properties of SK cements as compared to NK cement, is presumably due to the lesser structural development of the SK.

SK Cements. A. I. Gorina, *Kauchuk i Rezina*, 8, 37-38 (1940). **S-59.**

A series of tests was carried out to determine the best method for preparing SK cement. SK of low plasticity (0.20-0.25) was heated with oxidizers or accelerators or a combination of both. This partial vulcanization improved the cohesive properties of the product, lowered its plasticity, and increased the viscosity of its solution. However the adhesion of cements prepared from such SK was still not sufficient to permit its use alone. The adhesion was improved by admixing colophony or preferably the compound plasticizer NL. The results of various tests on the methods of admixing the different ingredients are reported.

Shrinkage of Sovprene Mixes. D. L. Margolin and L. P. Raspopova, *Kauchuk i Rezina*, 8, 39-43 (1940). **S-60.**

Sovprene mixes calendered at 30-45° C. shrink considerably. The extent to which such mixes shrink exceeds the shrinkage of mixes made with natural or with butadiene rubber. The Sovprene mixes shrink 400-500% of the calenders' clearance. Adding approximately 60% of fillers reduces the shrinkage, but not sufficiently to make it industrially usable. Shrinkage of Sovprene mixes was effectively checked when the calendering was carried out at 100-120° C. Sovprene compositions calendered at such temperatures were perfectly usable for industrial processes. The checking of shrinkage by high temperature calendering is attributable to the neutralization of the anisotropy of the system.

Distribution of Carbon Black in Rubber Mixes. A. V. Panova and M. S. Churmanteeva, *Kauchuk i Rezina*, 8, 43-48 (1940). **S-61.**

The uniformity of distribution of fillers is of paramount importance in compounding rubber. Since carbon black is the most important of the fillers, its distribution greatly affects the properties of the finished products. Of the several methods for determining the distribution of carbon black in rubber the direct microscopic method is considered the best. Heavily filled rubber will transmit light with difficulty, if at all; therefore the following method is suggested: trim a piece of rubber to form a wedge-shaped piece; from the apex cut a thin threadlike strip and place on a microscopic slide. Cover with 2-3 drops of benzene to cause the rubber to swell. After the rubber has swelled and the excess of benzene evaporated, cover with a cover glass and squeeze in a squeezer. Finally, examine under a magnification of 100-200 times. Specimens of SK polymerized without rods, rod-polymerized SK, and smoked sheet filled with 25, 50, 75, and 100% of carbon black were examined by the described method. The specimens were photomicrographed, and the illustrations are given. In the absence of dispersing agents the distribution of carbon black improved as the plasticity of the SK increased from 0.26 to 0.66.

(Continued on page 527)

OPB Bibliography Reports on Rubber Products—II

GERMAN Rubber Industry. P. D. Patterson. PB 167.[1] 1944. 25 pages. Mimeo, 25¢. Economic and technical information on the German and French rubber industries and their relations are described, including a description of the plant at Ets. Colombes Goodrich, a discussion of a rubber conference held at Heidelberg, and a description of the Office du Caoutchouc (Office of French Rubber Control). Appendices list personnel in the Europeon rubber industry, documents captured, and raw material samples brought back to the United Kingdom. The heat treating process for Buna and its compounding are also described.

Synthetic Rubber Plant, Ludwigshaven. P. D. Patterson. PB 176. 1945. 14 pages. Mimeo. 25¢. This report describes generally the I. G. Farben plant at Ludwigshafen-Oppau and contains valuable information on the layout of the German synthetic rubber industry as a whole, including a diagrammatic plan. Some information is also given on the Buna plant which produced Buna S3 and Buna SV, a product unsuitable for tires, and on the size and condition of the Buna and carbide plants.

Miscellaneous Rubber Targets. G. H. Perry and B. S. Garvey. PB 194. 1945. 12 pages. Mimeo. 25¢. An investigation of six rubber plants in the Frankfort-Hanau area is given. Peters Pneu Renova was a large, modern retreading plant in good condition and had considerable inventories of raw material. The plant and operations were briefly described, and recipe for the recap stock was given. Interesting information on rubber to metal adhesion, Naftolen, alumina pigments, and "I-Gummi" of the I. G. was found in the laboratory of Metallgesellschaft, A.G. Hanauer Gummischuh Fabrik, A.G., had been destroyed, and only outlines of the operations could be reconstructed. The plant of the Peters Union Tire Factory had been dismantled. The Frankfurt plant of Continental Gummiwerke, A.G., had been destroyed, and rubber activities of Dartex, A.G., had apparently been moved.

Deutsche Dunlop Gummi Compagnie, A.G., Hanau-Am-Main. Miscellaneous Chemicals. G. H. Perry and others. PB 191. 1945. 46 pages. Mimeo. 25¢. The plant investigated in this report was the second most important tire plant in Germany, making 32% of the tires for the German Air Force. The plant was considerably damaged and looted; the laboratory and giant tire building shop were completely destroyed, and the continuous thermal breakdown apparatus was damaged. A general outline of the plant and equipment is given. A discussion of the Bunas used is included, and the process is described in some detail. Typical recipes used in this plant are given, and reclaiming methods described. Samples of Koresin and Buna SS were sent to the Rubber Reserve Co. laboratory in Akron, O., and to the Rubber Control in London, England. Production figures, cost of raw materials, code names for chemicals used, recipes, and a list of documents collected appear in the appendices.

Franz Clouth Rheinische Gummiwarenfabrik Nippes, Cologne. W. L. White and R. A. Schatzel. PB 220. 1945. 13 pages. Mimeo. 25¢. This report gives a description of a plant and its equipment as used for the manufacture of tank linings and fittings, conveyer and transmission belts, and rubber covered rolls. Formulae are given for: under-covering of the hard linings and formula (H 17/6685 — B. Platte); various inorganic acids — H 36/6685 — R-hart; organic and oxidizing acids — H.128; friction 1475/44 (k) — conveyer belt; skim 3000/44 C—conveyer belt; cover 6-14-50—conveyer belt; cements used to apply to core also used on metal for tank linings; compounds for hardnesses ranging from Pussey & Jones 40-45 to hard rubber; molded goods.

Harburger Gummiwarenfabrik — Phoenix A.G., Harburg. PB 219. 1945. 16 pages. Mimeo. 25¢. Before the war Harburger was the second largest rubber company in Germany, manufacturing tires and tubes, footwear, hose, belting, druggists' sundries, toys, and molded goods. This report deals, in some detail, with flat transmission and conveyer belts, rubber reclaiming, and the manufacture of hose. Information on equipment, processes, formulae, and mixing procedures are given.

Production of Electric Cable and Molded Rubber-to-Metal Bonded Products. G. W. Ewald. PB 404. 1945. 5 pages. Photostat $1; microfilm 50¢. A short description of rubber, synthetic rubber, and rubber-like materials furnished to the Land und Seekabelwerke, Rheinische Gummiwerke, A.G., up to December, 1943, under the allocation system prevalent at that time, is given. Some data are also included, represented as being taken from a paper of the German agency allocating all rubber-like materials, on the storage stability of the various basic synthetics.

Test of 14 Goodrich 17.00 x 16 Tires with Pre-Rotation Vanes (Five-Foot Wind Tunnel Test No. 511). (Army Air Forces Technical Report No. 5243.) D. W. Young and J. B. Trenholm. PB 1467. 1945. 57 pages. Photostat $4; microfilm 50¢. This report gives results of tests of 14 tires, size 17.00 x 16 with varying numbers and types of pre-rotation vanes, in a five-foot wind tunnel at air speeds of 75, 100, 125, and 150 miles per hour. Description and photographs of the tires and vanes are also presented. The results appear graphically and in tabular form.

The German Rubber Footwear Industry. The German Sole and Heel Industry. H. W. Martin and W. E. Kavanagh. PB 1577. 1945. 75 pages. Photostat $5; microfilm $1. The first part is a report on the

(Continued on page 527)

[1] Through an oversight PB Report Numbers on several of the abstracts published in our June issue (p. 373) were omitted. The titles and the proper numbers follow:
Engelbert Factories—Liege and Aachen, Kabelundgummiwerke-Eupen PB 174.
The Harburger Gummiwaren-Fabrik, Phoenix, A.G., located in Harburg near Hamburg. PB 192.
Continental Gummiwerke A.G., Hanover—Miscellaneous Chemicals PB 190.

Electrostatic and Tensile Properties of Rubber and GR-S at Elevated Temperatures[1]

R. S. Havenhill, H. C. O'Brien, and J. J. Rankin[2]

In a previous paper[3] a new apparatus was described for measuring the electrostatic contact potential of rubber and GR-S compounds, and a correlation of tensile strength and electrostatic contact potential was observed. This work resulted in the formulation of an "Electrostatic Contact Potenial Theory of Reinforcement" in which reinforcement is explained on the basis of electrical contact potentials and resultant electrostatic attractive forces set up between the rubber and the reinforcing agents. For example, when a material which has a (+) positive electrostatic charge such as zinc oxide is added to rubber which has a (—) negative charge, strong electrostatic attractive forces are set up between the zinc oxide and the rubber and give rise to reinforcement. Now since (+) and (—) charges tend to neutralize each other, the electrostatic contact potential or electrical charge on the resulting stock should be more positive (less negative) than it was prior to the addition of the zinc oxide. This was found to be the case; and in general, the more positive the stock, the higher the tensile strength.

On the basis of this theory, we would predict that rubber compounds, when heated, would become highly negative, which would indicate a low hot tensile strength. This was found to be the case.

It is the purpose of this paper to describe a new apparatus for measuring contact potentials at elevated temperatures and to point out that the contact potential of both rubber and GR-S compounds becomes highly negative at 212° F. This increase in negative potential, which may be a "boiling off" of electrons and resultant disruption of electrostatic attractive forces within the material, is much greater for GR-S than for rubber and probably accounts in part for the much greater decrease in tensile of GR-S over rubber at elevated temperatures and is further confirmation of the electrostatic contact potential theory of reinforcement.

By the application of this theory, materials which maintain their highly positive charge at elevated temperatures should make the GR-S stocks more positive, prevent the release of electrons, and increase the hot tensile strengths. This was found to be the case; and certain materials such as proteins, finely divided silica and sodium silicate, when added as water dispersions to GR-S latex, gave products having considerably improved tensiles at elevated temperatures.

High Temperature Contact Potential Apparatus

To measure contact potentials at elevated temperatures, the rubber test specimen must be heated to the desired temperature on an electrically insulated surface, momentarily contacted with a cold reference surface (preferably polished steel), and instantly separated therefrom. The electrical charge or contact potential then can be measured on either the rubber test specimen or on the standard reference contacting surface as the charges are equal and opposite. In our previous apparatus,[3] an insulated steel plunger contacted the test specimen, and the charge was measured on the test specimen, which was mounted in a sample holder built into the electrostatic modulator. In this apparatus it is difficult to build the electrical heater around the sample and provide adequate electrical shielding to prevent the hot a.c. electrical fields around the heater from being picked up on the grid of the audio amplifier. Furthermore the charged plunger should be out of the test specimen's high temperature electrostatic field when measurements are made. The modulator unit should be isolated from the hot electrostatic field around the sample. To take care of these difficulties, a new apparatus was designed.

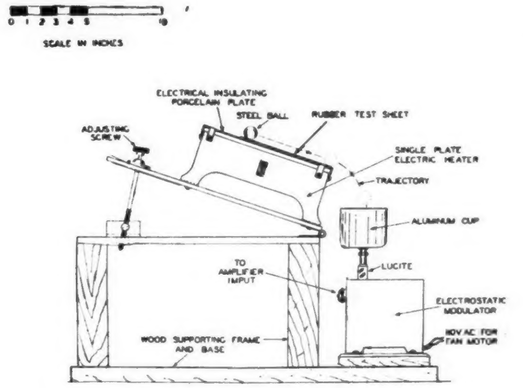

Fig. 1 Rolling Ball Contact Potential Apparatus

Rolling Ball Contact Potential Apparatus

In this apparatus (Figure 1) the electrostatic charge, acquired by rolling a steel ball down the surface of a rubber test specimen on a heated inclined plane, is measured when the ball drops into the cup of a suitable measuring device, such as our electrostatic modulator.

The electrostatic modulator was described completely in our previous paper.[3] Briefly, it consists of a motor-driven fan which cuts the electrostatic field produced by the charged sample and converts it into an alternating current voltage which easily is amplified and measured by the associated audio-frequency amplifier, and built-in output meter. The electrostatic modulator and amplifier were calibrated with an adjustable d.c. high-voltage power supply. The power supply leads were attached to the modulator cup and chassis. Amplifier output meter readings were plotted against input volts from the d.c. power supply. The contact potential values reported are all in terms of these input volts. These contact potential values are not the actual contact potentials since they depend on the capacity of sample, capacity of modulator system, and a number of other factors; however, they are proportional to the actual contact potentials of the rubber test specimens.

With this apparatus the test specimen is both shielded and electrically insulated from the heater by means of

[1] Reprinted (in part) from *J. Applied Phys.*, 17, 5, 338 (1946.)
[2] Research laboratories, St. Joseph Lead Co., Josephtown, Pa.
[3] R. S. Havenhill, H. C. O'Brien, and J. J. Rankin, *J. Applied Phys.*, 15 731-40 (1944).

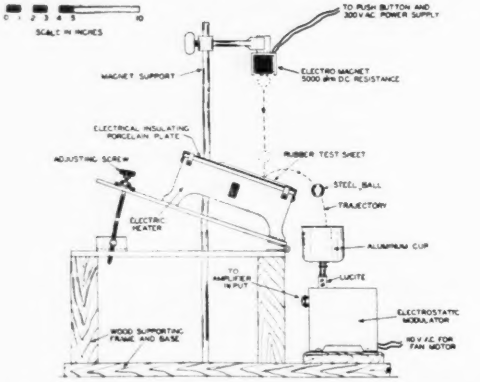

Fig. 2. Bouncing Ball Contact Potential Apparatus

the porcelain enameled steel top plate. The charged steel ball which contacts the specimen is isolated from electromagnetic and electrostatic fields when measurements of its charge are made in the shielded electrostatic modulator unit. While this apparatus has a number of advantages over the plunger-type apparatus, for high temperature measurements, it also has some disadvantages. The contact area and velocity of the ball, as it leaves the sample, are not constant for all samples. For example, a soft stock will have a greater contact area than a hard one, and a stock with a tacky surface will retard the velocity of the ball which affects the speed of separation of the ball from the test specimen. Since both of these factors affect the contact potential values, they must be taken into account in testing unknown compounds. For similar compounds these differences usually do not exceed 10% error. The relative contact area can be estimated approximately by coating the steel ball with "fingerprint" ink and measuring the length and the width of the black streak thus produced. The relative velocity of the ball, as it leaves the sample, can be estimated from its trajectory. The greater the velocity of the ball, the greater will be the horizontal range on the trajectory curve. This distance can be easily measured from the imprint of the ball on carbon over white paper.

Bouncing Ball Contact Potential Apparatus

To secure a more intimate contact between the steel ball and the test specimen the "bouncing ball"-type apparatus was designed. Refer to Figure 2. In this apparatus, which is in part similar to the rebound apparatus described in a previous paper[4], the steel ball is held above the test specimen by means of an electromagnet and is dropped upon the rubber test specimen which is mounted on a heated inclined plane, and the ball is bounced into the electrostatic modulator where its charge is measured. With this apparatus the work done on the sample during a test is so great that there is some evidence that it brings about a structural change in the rubber. In any case, repeated tests on the same spot in the rubber show a progressive decrease in charge (stocks become more positive) which would indicate an increase in tensile strength.

Testing Procedure

A six- by six- by 0.075-inch tensile sheet[5] cured in a clean chromium-plated mold is used for test. The carefully prepared specimen,[3] whose surface should be free from dust, lint, surface bloom, or other foreign matter and free from electrical charge, is placed on the inclined plane and brought to the desired testing temperature by proper adjustment of the Variac supplying the current for the electric heater. Temperature can be measured by means of a thermocouple placed on the stock and another built into the top surface of the inclined plane. A four-minute heating period is usually required to bring the tensile sheet to a testing temperature of 212° F. The steel ball (ball bearing) which is used to contact the sample is first cleaned with c.p. acetone. The ball is then picked up and gently placed on top of the rubber test sheet and allowed to roll freely down the rubber on the incline and drop into the cup of the electrostatic modulator, where its charge is measured on the output meter of the audio-amplifier. This test is repeated several times, taking care to roll the ball over a fresh uncontacted surface each time. The test specimen should be placed slightly over the lower edge of the inclined plane so that arcing and resultant discharge of the ball cannot take place between the ball and the metal of the heater.

The specimen preparation and test procedure for the "bouncing ball" apparatus are the same as for the "rolling ball" apparatus with the exception that in the former the ball is released from an electromagnet and bounced instead of rolled into the electrostatic modulator. A thicker test specimen is sometimes desirable with this apparatus, and samples 0.20-inch in thickness were used for certain tests. All contact potential measurements must be made in a constant temperature, constant humidity room; 78° F. and 45% relative humidity testing conditions have been found satisfactory. Like all electrostatic work, results are difficult to duplicate, and a large number of tests must be run.

Experimental Data

Increase of Contact Potential with Temperature

Our electrostatic contact potential theory of reinforcement predicts that GR-S should become highly negative at elevated temperatures in order to explain the low hot tensiles of GR-S. To check this, contact potentials were run at 78 and 212° F. on a 20-volume zinc oxide loaded GR-S stock and also on a similar rubber stock. Data were obtained with both the "rolling ball" and "bouncing ball" contact potential equipment. Rebound data were also obtained using the St. Joe inclined plane falling ball rebound tester.[4] Hot tensile data were obtained using the St. Joe electric heater attachment[6] for the Scott tensile machine.

TABLE 1. COMPARISON OF "ROLLING BALL" AND "BOUNCING BALL" ELECTROSTATIC CONTACT POTENTIALS OF RUBBER AND GR-S

Test	GR-S Formula *A*		Rubber Formula *B*	
	78° F.	212° F.	78° F.	212° F.
*Electrostatic contact potential volts				
1. Rolling ball apparatus	116	293	103	140
2. Bouncing ball apparatus	36	89	28	37
Tensile lb./sq. in.	1000	115	3500	2100
% elongation	930	400	620	625
Modulus @ 400% (lb./sq. in.)	125	115	1200	—
% rebound	35	36	44	56
Shore hardness	42	—	51	—
Rex hardness	44	—	53	—

Formulae

A		*B*	
GR-S	100.	Rubber	100
Sulfur	2.5	Sulfur	3.5
Captax	1.5	Captax	0.6
ZnO	113.	Stearic acid	1.5
		ZnO	113.
	217.0		218.6
Cure 55'×280° F.		Cure 35'×280° F.	

* The contact potential values are in terms of negative input volts at modulator. The smaller the value, the more positive (+) the potential.

[4] R. S. Havenhill and J. J. Rankin, INDIA RUBBER WORLD, 107, 365-68 (1943).

[5] A.S.T.M. D15-41.

[6] Test Method Card No. 66 File S-2 dated Oct. 23, 1943, Research Compounding Section, Research and Development Division of the Office of Rubber Director, Washington, D. C.

These data are shown in Table 1. The zinc oxide used in these and all subsequent tests was a fine particle size (0.2-micron average diameter), fast-curing type produced by the St. Joe electrothermic process. It will be noted that the GR-S contact potential increased about 150%, while the rubber contact potential increased less than 50%. This was true for both the "rolling" and "bouncing" ball-type apparatus. These data checked the theory, and it was decided to repeat these tests and run additional ones at different temperatures on both high zinc and pure gum rubber and GR-S stocks. Since the "bouncing ball" apparatus gave such low contact potentials because of small contact area, the results were difficult to check, and all subsequent tests were run using only the "rolling ball" apparatus. These contact potential data are shown in Table 2. The tensile data are shown in Table 3. It will be noted that in all cases there is an increase in negative contact potential as the temperature is increased. This corresponds with a decrease in tensile with temperature and is further confirmation of the "Electrostatic Contact Potential Theory of Reinforcement."

It is interesting to note that the high contact potential values observed at elevated temperatures tend to persist for a short time after the stock is cooled, indicating an alinement or orientation of charges such as a semi-permanent polarization of the stock.

Addition of Positive (+) Materials to GR-S To Increase Hot Tensile Strengths

A number of materials having, in effect, a less negative (more +) electrostatic contact potential were added to GR-S to make it less negative (more +) at elevated temperatures and, according to the theory, increase its tensile strength. Some of these materials, such as Flectol H, while (+) and effective in increasing tensile strength at room temperatures, became highly negative at elevated temperatures; and for this reason neither made the stocks more positive nor increased the tensile at elevated temperatures. A few of these materials when properly dispersed, maintained their positive charge at elevated temperatures, making the GR-S less negative and gave increased tensile strength stocks. These materials were finely divided SiO_2, Na_2SiO_3, and certain proteins such as egg white. These materials were not effective, when milled into GR-S, and did not change appreciably the contact potentials or tensile strengths. A careful examination of the stocks showed poor dispersion of all of these materials. In order to get effective dispersions these materials were dispersed in water, and the water dispersions added to GR-S latex. The procedure was as follows.

Latex Dispersions

To 1,000 grams of Type II GR-S latex (30% solids) were added water dispersions of the positive (+) materials in such an amount as to give 20% on the GR-S solids. Then 600 grams of 50% Black Label No. 20 zinc oxide dispersed in water with 1% of Stablex B were added. Coagulation was carried out by the addition of 100 to 200 cubic centimeters of 28% Epsom salt solution. Egg white and, especially, sodium silicate are good dispersing agents for zinc oxide and act as stabilizing agents, making it difficult to coagulate the latex. After coagulation the material is dried at 190° F. for approximately 24 hours or until the moisture content is under 0.35%. The resulting GR-S masterbatch contains approximately 50% of zinc oxide and 20% (on GR-S) of the added (+) material. Compounding then was carried out, and regular milling procedure followed in basic Formula *E*. Formula *E* is similar to

FORMULA *E*

	Parts by Weight
50% zinc oxide master batch from GR-S latex (spec.)	200.
Sulfur	2.5
Captax	1.5
	204.0

Formula *A*, except that it contains 18 volumes of zinc oxide instead of 20 volumes.

The tensile, rebound, and contact potential data are shown in Table 4. It will be noted that these materials markedly increased the contact potential (made it more positive) and increased both the room-temperature tensile and the hot tensile of GR-S. The hot tensile is more than doubled in case of the egg white (albumen) and sodium silicate stocks. Modulus, hardness, and rate of cure also are increased, while rebound data are of the same order. The stocks containing the egg albumen were different from any of the other stocks in that they milled out extremely smoothly and gave a

TABLE 2. EFFECT OF TEMPERATURE ON ELECTROSTATIC CONTACT POTENTIALS OF RUBBER AND GR-S

			Electrostatic Contact Potentials "Rolling Ball" Apparatus Volts				% Rebound		Hardness 78° F.	
Formula	Composition	Min. Cure @ 280° F.	78° F.	145° F.	212° F.	278° F.	78° F.	212° F.	Shore Max.	Rex
C	Pure gum rubber	35	100	120	150	250	48	59	42	43
D	Pure Gum GR-S	55	150	225	325	450	42	43	35	35
A	20-vol. ZnO rubber	35	85	115	140	185	44	56	51	53
B	20-vol. ZnO GR-S	55	115	200	285	400	35	36	42	44

Formulae

C		*D*	
Rubber	100.	GR-S	100.
Sulfur	3.5	Sulfur	2.5
Captax	0.6	Captax	1.5
Stearic acid	1.5	ZnO	5.
ZnO	5.		109.0
	110.6		

See Table 1 for Formulae *A* and *B*.

TABLE 3. EFFECT OF TEMPERATURE ON TENSILE OF RUBBER AND GR-S COMPOUNDS

			78° F.			145° F.			212° F.			279° F.		
Formula	Composition	Cure Min. @ 280° F.	Tens. P.S.I.	Elong. %	Mod. @ 400% P.S.I.	Tens. P.S.I.	Elong. %	Mod. @ 400% P.S.I.	Tens. P.S.I.	Elong. %	Mod. @ 400% P.S.I.	Tens. P.S.I.	Elong. %	Mod. @ 400% P.S.I.
C	Pure gum rubber	35	3350	775	315	2850	675	400	2200	760	275	160	250	—
D	Pure gum GR-S	55	145	450	75	85	250	—	50	150	—	25	160	—
B	20-vol. ZnO rubber	35	3500	620	1200	2850	640	750	2200	625	500	465	400	465
A	20-vol. ZnO GR-S	55	1000	930	125	225	500	150	125	425	100	65	275	—

See Tables 1 and 2 for formulae.

TABLE 4. ADDITION OF (+) MATERIALS TO GR-S LATEX

Composition	Cure Min. @ 280° F.	Electrostatic Contact Potentials Volts 78° F.	212° F.	Original tensiles 78° F. Tens. P.S.I.	Elong. %	Mod. @ 400% P.S.I.	Tensiles @ 212° F. Tens. P.S.I.	Elong. %	Mod. @ 400% P.S.I.	% Rebound 78° F.	212° F.	Hardness 78° F. Shore 15 Sec.
Standard	50	100	275	900	850	225	150	300	—	36	37	40
20% egg white	20	93	180	1475	538	1000	400	250	—	37	40	49
20% SiO_2	50	95	195	1325	990	200	300	400	300	33	34	37
20% Na_2SiO_3	40	90	175	1475	450	1200	400	200	—	36	39	49

Postive (+) materials added
2 egg whites added to 1,000 grams of Type II GR-S latex (30% solids)
400 grams of 15% Santocel (SiO_2) dispersed in water
120 grams of 50% sodium silicate in water.
Basic Formula *E* (See Text).

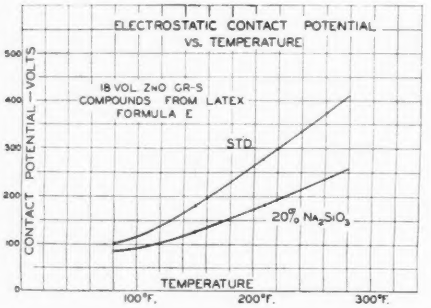

Fig. 3. Contact Potential *vs.* Temperature for Sodium Silicate Stocks

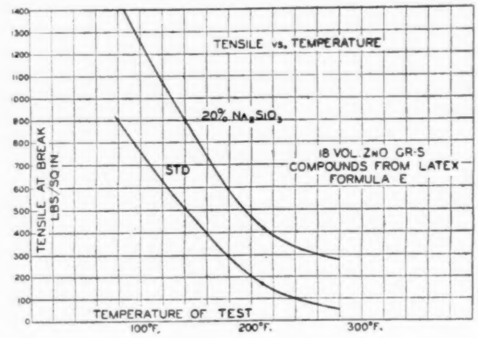

Fig. 4. Tensile *vs.* Temperature for Sodium Silicate Stocks

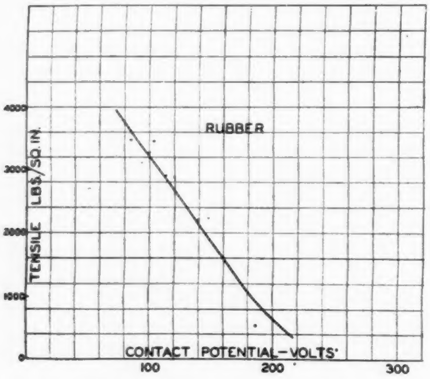

Fig. 5. Contact Potential *vs.* Tensile Strength for All Rubber Compounds

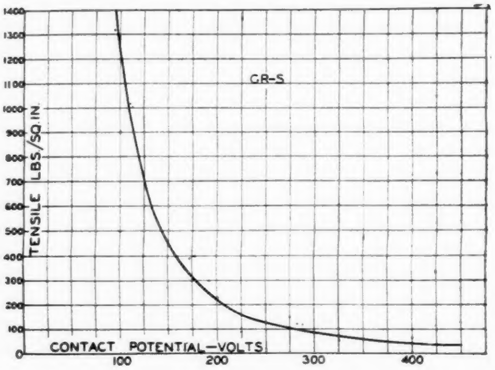

Fig. 6. Contact Potential *vs.* Tensile Strength for All GR-S Compounds

long, plastic, uncured sheet when taken from the mill. They resembled natural rubber more in this respect than any other GR-S material we have observed.

Discussion of Results

To show the relations between temperature, contact potential, and tensile, additional data were obtained at various temperatures on the standard latex compound containing no sodium silicate and on one containing 20% sodium silicate. These data are shown in Table 5 and have been plotted in the form of curves. Refer to Figures 3 and 4. Figure 3 shows the increase in contact potential with temperature and also that the addition of Na_2SiO_3 greatly decreases the contact potential and makes the stock more positive (+). Figure 4 shows how the tensile drops off with the temperature and shows the superiority of the Na_2SiO_3 stock.

In Figure 5 the contact potential data for all the rubber compounds run at different temperatures have been plotted against the tensile strength values, and it appears that there is a relation between tensile strength and contact potential.

In Figure 6 the contact potential data for all the GR-S and GR-S latex compounds run at different temperatures have been plotted against the corresponding tensile strength values, and again it appears that there is a correlation of contact potential and tensile strength; however, it is a different one from that for rubber as might be expected from the difference in physical and chemical properties of the two materials. These data are all further confirmation of the "Electrostatic Contact Potential Theory of Reinforcement."

TABLE 5. EFFECT OF TEMPERATURE ON GR-S CONTAINING SODIUM SILICATE

Temperature of Test—°F.	Contact Potential Volts Standard Stock	20% Na_2SiO_3 Stock	Tensile Strength: Standard Stock No Sodium Silicate Tens. P.S.I.	Elong. %	Mod. @ 400% P.S.I.	20% Sodium Silicate Tens. P.S.I.	Elong. %	Mod. @ 400% P.S.I.
78	100	85	900	850	225	1475	475	1000
145	180	125	500	400	300	890	425	700
212	275	185	150	300	—	400	200	—
279	410	255	50	150	—	275	225	—

Basic Formula *E*.

Summary and Conclusions

A new apparatus has been described for measuring contact potentials of rubber and GR-S compounds at

elevated temperatures. In this apparatus the electrostatic charge, acquired by rolling a steel ball down the surface of a rubber test specimen on a heated inclined plane, is measured when the ball drops into the cup of the electrostatic modulator. This potential, while not the actual contact potential, is, nevertheless, proportional to it. With this apparatus the contact potential of GR-S at elevated temperatures was found to increase much more (become more negative) than for rubber. The release of electrons (increase in negative contact potential) and consequent disruption of electrostatic attractive forces within the material at elevated temperature probably partly accounts for the much greater decrease in tensile of GR-S over rubber and is further confirmation of the "Electrostatic Contact Potential Theory of Reinforcement."

By the further application of this theory, highly positive (+) materials, such as certain proteins, finely divided silica, and sodium silicate, which retain their positive charge at elevated temperatures and make the stocks more positive, have been found to more than double the hot tensiles of high zinc oxide loaded compounds made from GR-S latex.

Acknowledgment

The authors wish to acknowledge the valuable assistance of the staff of the St. Joe Research Laboratory and particularly that of G. F. Weaton, plant manager; Mrs. D. E. Taylor, Harold Emery, L. E. Carlson, L. A. Cha, and Charles Black, who have contributed to the preparation of this paper.

Recent Russian Literature

(Continued from page 521)

Two-Step Rectifier for SK Plants. G. K. Larionov, *Kauchuk i Rezina,* 8, 48-50 (1940). **S-62.**

A two-step rectifier for SK plants is described. First the alcohol is concentrated to a 60% content of ethyl alcohol. It then passes through distillation columns operating at 4 and 10 atmospheres. This set-up is said to effect a considerable saving in the consumption of steam.

Standardization of Recipes and Construction of Rubber Products E. M. Rabkin, *Kauchuk i Rezina,* 8, 53-54 (1940). **SN-97.**

The necessity of accepting uniform recipes and construction details of rubber products for the entire industry is discussed.

Tire Production. M. M. Mar'yanovskii, *Kauchuk i Rezina,* 8, 55-57 (1940). **SN-98.**

Production methods of the Leningrad and Yaroslav tire plants are compared, and it is shown that owing to better organization the quantity and the quality of the Yaroslav plant products are better.

Tire Cord. I. G. Charukhin, *Kauchuk i Rezina,* 8, 58-62 (1940). **M-27.**

The quality of cord greatly affects the performance of tires. An investigation was conducted to determine the most suitable cord for use in tire construction. Tires were built using the cords: 37/5/3, 28/4/3, 22/3/3, and 22/3/3 having 18/9 twists per 25 mm. The tires were tested in a machine with the following results (the results obtained with 37/5/3 is taken to be 100): 100, 94.5, 71.9, and 55.9. These results are explained by the following: As the tire runs, a certain dislocation of the cord's treads with respect to one another takes place. This dislocation is accompanied by fraction in consequence of which heat is generated. Temperatures as high as 120° C. were observed while the tires were tested. This heat not only evaporates the natural moisture of the fibers, but also affects adversely the natural fats and waxes of the fibers. As a result, the fibers become hard and brittle and break readily. The looser the cord, the greater the dislocation of its fibers, and, consequently, the greater the friction and the heat generated. Therefore, the tighter the cord is wound, the greater the strength of the tire in which it is used. But the production of very tight cords has many disadvantages. The author discusses at length how to overcome some of these difficulties and compromise with others to produce a desirable tire cord.

Improving the Quality of Wedge-Shaped Belts. A. P. Chelyuk, Z. N. Klebanova, and F. M. Sokolovskaya, *Kauchuk i Rezina,* 8, 62-66 (1940). **SN-99.**

Suggestions offered for improving the quality of V-belts contemplate the use of a special cord having a minimum elongation at increased twists, mechanization of production methods, and revision of existing standards. Other suggestions include expansion of research and testing under careful supervision.

(To be continued)

OPB Bibliography Reports

(Continued from page 522)

production of rubber footwear giving detailed statistics on the production of waterproof and vulcanized canvas footwear, of the rubber content of various types of footwear, and on the consumption of Buna and reclaimed rubber. Also included are basic formulae used in rubber footwear production, fabric specifications for footwear, method of construction of gas protection rubber boot, and a description of a reclaiming process. Samples obtained were forwarded to the Quartermaster General, Washington, D. C. It is stated that manufacturing problems are more severe than in the United States owing to the use of spun rayon fabrics and the lack of rubber cement and latex.

The second part reports the developments in synthetic rubber soles and heels and the adhesives used in this industry. German soles are harder; cold-flow properties are lower, and stitch-tear resistance is relatively high. The amounts of synthetic and reclaim which could be used in shoe compounds were definitely restricted. Brown no-mark soling material was developed using a new pigment, an aluminum oxide gel called TEG. Ago cement was generally used in attaching synthetic rubber soles. The report also includes detailed information on sole leather substitute, P soling, army sole, physical testing of synthetic soles, substitute leather, salamander, non-marking sole, a rapid reclaiming method, and the heat treatment of Buna S. Appendices contain statistics, formulae, regulations for the testing of sole plates, instructions for operating machinery, and also photographs and blue prints of machinery.

(To be continued)

EDITORIALS

Don't Sell GR-S Short!

SOMEWHAT sooner than most of the rubber industry expected, the synthetic rubber producing capacity built in this country during the war was effective in preventing a too-great increase in natural rubber prices by the British, Dutch, and French producers. Owing to a complicated, but not unforeseen shortage in the world's food supply, the existence of, although incomplete use of, this capacity to produce synthetic rubber could only enable this country to limit the extent of the price increase instead of preventing it entirely.

The agreements signed during June with the European interests controlling the production of natural rubber in the Far East by this government with the governments of the United Kingdom, the Netherlands, and France, raised the price to the United States from 20¼¢ a pound, f.o.b. Far Eastern ports, to 23½¢ a pound, effective July 1, for a six-month period. This price would have been much higher if this country had not, by reason of wartime necessity, become a major producer as well as a major consumer of rubber. The price could have been maintained at the 20¼¢ a pound level or even lowered, if this country had been able to operate its full GR-S capacity during the past few months, instead of only half of it because of the world shortage of grain for food.

The British, Dutch, and French natural rubber producers definitely wanted to sell their rubber to the United States at a price of more than 25¢ and even more than 30¢ a pound, and in view of the present exceptionally high cost of producing rubber in the Far East their position in this stand is quite logical and understandable. However, if conditions now had been the same as before the war and this country did not have its plants for producing synthetic rubber, or, if at some time in the near future our synthetic plants and/or processes are allowed to become obsolete, natural rubber prices of 30¢ or more a pound may be asked and, of necessity, paid, if the domestic demand for rubber products continues at or near its present record level.

When one stops to consider the significance in dollars of an increase of only one, two, or at the most five cents a pound in the price of rubber to manufacturers of rubber goods and the consumers of these goods in the United States, the extreme importance and value of our GR-S plants is most effectively emphasized. We were using rubber in this country during the first half of 1946 at a rate of more than one million tons a year, and although actual consumption for 1946 may be somewhat less than this rate figure, an increase of 1¢ a pound is equivalent to an increase in the cost of their basic raw material to the rubber goods manufacturers of $22,240,000 a year, and a 5¢ a pound increase, of $112,200,000 a year. Admittedly at the moment only one-quarter to one-third of this one million tons used is natural rubber and more than 200,000 tons of this has already been purchased at the 20¼¢-a-pound price. The 150,000 tons of natural rubber to be purchased during the last half of 1946, however, will cost this country $78,960,000, instead of $68,040,000, a difference of $10,920,000 by virtue of the new price agreement.

Let it be assumed, for purposes of argument, that manufacturers of rubber products in the United States will buy their natural rubber direct from the British, Dutch, and French producers beginning in 1947 and that the best price they can obtain averages 10¢ a pound more than the 22½¢ they have been paying to date. Forward estimates of the amount of natural rubber that will be used in this country in 1947 and 1948, taking into account availability, stockpile requirements, natural *versus* synthetic quality, and manufacturer preference, are, about 400,000 tons in 1947 and 500,000 tons in 1948. Let it also be assumed that the world food situation will be such that during most of this period these amounts of natural rubber will have to be used because of our inability to utilize our alcohol-butadiene plants to produce enough GR-S to use in place of these amounts of natural rubber at the 10¢-a-pound higher price. In 1947 this increased cost to the rubber industry would be about $90,000,000 and in 1948, about $112,000,000.

It goes without saying that the rubber industry in the United States does not want to pay more than 22½¢ a pound for rubber, whether it be natural or synthetic, and, in fact, is most desirous of being able to buy rubber at a considerably lower figure. Increased labor costs, the possibility of high government taxes for some time to come, and the ever-present threat of reduced sales if prices for its products have to be raised higher and higher to provide a reasonable profit, all combine to make low priced rubber almost a necessity for continued high-level operations.

No matter who owns and operates the GR-S plants during the next two or three years, whether it be the government or the rubber industry, the stabilizing effect of these plants on world rubber prices, aside from the further consideration of national security, will be worth more than their cost within the course of the next few years.

In the not-too-far-distant future, the price of natural rubber to manufacturers of rubber products in this country will not be the fixed government price of 22½¢ a pound, but it will be the price they are able to negotiate, either independently or through rubber brokers, with the British, Dutch, and French producers. Any and all increases in the cost of natural rubber will be borne directly by the manufacturers themselves.

A most important factor, therefore, is not to sell GR-S short, but to be sure that its production and development by both government and the rubber industry are continued at all times in the most aggressive manner, if stability in the industry is to be maintained.

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Scientific and Technical Activities

Neoprene and Perbunan Latices Discussed

SOME 100 members and guests attended a dinner meeting of the Philadelphia Rubber Group at Kugler's Restaurant on June 7. Speakers of the evening were Benton Dales, of E. I. du Pont de Nemours & Co., Inc., whose topic was "Neoprene Latex in Industry," and Robert E. Clayton, of Stanco Distributors, Inc., who spoke on "Perbunan Latex Compounding and Properties."

Since neoprene latex products can be made to give equal or better service in specific applications than natural latex products, the deciding factor in selection of the latex to be used will be that of cost, said Dr. Dales. The cost of neoprene latex products may be reduced by compounding until the difference between it and that of natural latex is less than may be supposed. Dr. Dales stressed the two important differences between neoprene and rubber latices that affect all neoprene latex compounding. Neoprene from latex requires more time and heat for proper vulcanization and dries more slowly than natural latex. Proper drying and sufficient cure are generally requisites for the preparation of good products, and the necessary time or cost may be decisive in determining whether neoprene latex will be used in a certain process or in machines designed for natural latex.

Neoprene latex must be properly compounded to yield the best products. For vulcanization, 3-5% of zinc oxide is needed, and 2% of phenyl-beta-naphthylamine, or equivalent antioxidant, is necessary for good aging properties. Acceleration of the curing rate may be obtained by use of either 2% of Polvac, or of 1% Polvac and 1% of dithiocarbamates or other accelerator. Although proper cure is the most important factor for obtaining resistance to stiffening or freezing, improvement in this property can be secured by the addition of either 1% of sulfur, up to 7.5% of suitable dispersed factices, or 10% of GR-S Latex No. 3.

Dr. Dales pointed out that a number of compounding ingredients in amounts up to 20 parts confer desirable properties on neoprene latex products and sometimes improve processing behavior, as in dipping. Among these are hard clay, lithopone, zinc sulfide, and aluminum hydroxide. Semi-reinforcing blacks may often be used advantageously up to 15%. Discoloration of neoprene latex films on exposure to light may be reduced greatly by compounding with 25 parts of zinc oxide, or 2-3% of AgeRite Alba or Santowhite.

In his talk, illustrated by means of slides, Mr. Clayton noted that there is now available in the form of Perbunan Latex Type H a concentrated water dispersion of Perbunan 26 which has found extensive use where oil resistance, high temperature aging, and abrasion resistance are desired.

The general compounding procedures for Perbunan latex are the same as for natural rubber latex, said Mr. Clayton. Stabilization toward the action of compounding ingredients is obtained by the addition of certain amines, such as dimethylamine and diethylamine, potassium or sodium hydroxide, or detergents, including soaps or combinations thereof. Perbunan latex is vulcanized with the same type of curing ingredients as those used for natural latex, but has a somewhat faster rate of cure.

The pure gum physical properties of Perbunan are rather low, as is the case with all butadiene-type emulsion polymers. Considerable reinforcement is obtained, however, by means of fillers, such as various carbon blacks and clays which improve tensile strength and tear resistance. Mr. Clayton emphasized that the ability of Perbunan latex to be thus reinforced is an important consideration from the standpoint of cost, as well as the resulting physical properties. The same softeners customarily used in Perbunan 26 dry rubber compounding may be used with Perbunan latex. In dipping processes, softeners have been found to eliminate cracking that otherwise tends to occur as the film dries. The usual thickeners for natural latex, such as the caseinates, alginates, polyacrylates, methyl cellulose, various gums, etc., are also effective with Perbunan latex. The speaker also presented and discussed compounds for latex foam sponge, general dipped goods, leather and cork compositions, impregnated paper, and coated fabric.

There was no business transacted during the meeting, and the entertainment consisted of community singing. Further plans for the group's next meeting, a golf outing tentatively scheduled for September 20, will be announced at a later date.

Ontario and Buffalo Groups Hold Joint Meeting

THE last meeting of the season of the Ontario Rubber Section, C.I.C., was held on June 5 as a joint dinner meeting with the Buffalo Rubber Group at the General Brock Hotel, Niagara Falls, Ont., Canada. Approximately 100 members and guests attended the meeting, which was presided over by A. B. Lockley, secretary-treasurer of the Ontario group, in the absence of its regular chairman, J. W. Holmes, Jr.

Speaker of the evening was Maj. Glen Gay, of the Chemical Warfare Laboratories, Department of National Defence, Ottawa, whose topic was "Investigation of German Rubber Companies." Major Gay visited Germany in the Fall of 1945 to investigate protective clothing, footwear, and special molded items being produced there during the war. The speaker stated his opinion that Germany lagged behind the Canadian and the United States industry in manufacturing methods, production rates, and general technique. From 1935 on, Germany had concentrated on the production of war stores to the neglect of her basic industry. There was little interchange of information between the various manufacturing companies, between producers of rubber chemicals and the users, and between industry and government agencies. Little new equipment had been introduced for some years prior to the war, and little knowledge and technical advances had been made since 1939. The speaker was introduced by C. H. Black, of the Canada Wire & Cable Co., and thanked by E. R. Briggs, secretary-treasurer of the Buffalo Group.

The following officers were nominated and elected by the Ontario Rubber Section for the next season: Chairman, A. B. Lockley, The Goodyear Tire & Rubber Co of Canada, Ltd.; secretary-treasurer, J. P. Hooper, H. L. Blachford Co.; executive committee, G. J. Baxter, Firestone Tire & Rubber Co., of Canada, Ltd.; Eric Bolton, B. F. Goodrich Rubber Co., of Canada, Ltd., and D. F. Walker, Dunlop Tire & Rubber Goods Co., Ltd.

Record Carbon Black Output and Sales in 1945

BOTH production and sales of carbon black exceeded one billion pounds for the first time in 1945, according to a report from the Bureau of Mines, United States Department of the Interior. Production increased 31% over 1944 to 1,052,798,000 pounds, aided by completion of several new plants. The 1945 rate of output continued below demand until early summer, when smaller demand for military tires eased the situation. In the late months of 1945, production overtook the rate of sales, and producers' stocks increased to 102,005,000 pounds on December 31, compared with 69,243,000 pounds at the end of 1944.

The production of channel blacks, that had declined from 1940 to 1943, gained 30% over 1944 to a new record of 538,539,000 pounds. Furnace black output continued its upward trend, increasing 33% to 514,259,000 pounds in 1945, or 49% of total production, compared with 48% in 1944. Texas output of all grades gained 44% over 1944 and equalled 69% of the U. S. total. Gas consumed in carbon manufacture increased 21% over 1944 to a new record of 431,830 million cubic feet. The average yield of carbon black was 2.32 pounds per thousand cubic feet of gas in 1945 and 2.20 pounds in 1944. The average value of natural gas used increased to 2.28¢ per thousand cubic feet from 1.62¢ in 1944, and was more than double the average (1.13¢) of 1941.

Sales to rubber companies increased from 738,029,000 pounds in 1944 to 804,386,000 pounds in 1945, and exports increased 11% to 173,773,000 pounds as shipments to Europe expanded after the war. Larger sales to paint manufacturers were offset by smaller taking by the ink and miscellaneous trades. The average value of carbon black at the plants rose to 4.02¢ a pound in 1945, the highest average since 1929.

There were 58 plants operated in 1945, compared with 54 in 1944. Two plants, one roller in Kansas and one channel in Louisiana, were not operated in 1945. Five new channel plants, two in New Mexico, one in Oklahoma and one in Texas, began operations, as did one new furnace plant in Texas.

Additional Experimental GR-S and GR-S Latices

ADDITIONS to the list of experimental GR-S dry polymers and GR-S latices available for distribution of rubber goods manufacturers from the Office of Rubber Reserve, RFC, under the conditions outlined in our November, 1945, issue, page 237, have been received and are listed below:

X-Number Designation	Manufacturing Plant	Date of Authorization	Polymer Description	Special Characteristics
X-306-GR-S	Firestone, Akron	5/20/46	Regular GR-S-AC, modified with a mixture of DDM and mixed tertiary mercaptans.	This polymer is being made and tested at the present time in view of the possible future shortage of DDM.
X-311-GR-S	Firestone, Akron	5/29/46	Regular GR-S-AC except that this polymer contains 1.5% Ajone C anti-oxidant.	This polymer is being made to test a new antioxidant in GR-S.

Reauthorizations have been issued for the following polymers which were previously authorized, made, and in consumers' tests found advantageous:

X-222-GR-S	Firestone, Akron	5/24/46	Alum coagulated GR-S made with dehydrogenated rosin soap.	Polymers made with dehydrogenated rosin soap show a quality advantage, i.e., better tack.
X-250-GR-S	Goodrich, Louisville	5/24/46	Regular GR-S at 45 ± 5 Mooney, shortstopped with hydroquinone, no antioxidant.	General purpose use.
X-274-GR-S	National Synthetic, Louisville	6/7/46	GR-S-10 shortstopped with sodium sulfide and stabilized with Stalite	For same purpose use as GR-S 10. Produced for materials where a special non-discoloring antioxidant is required.
X-281-GR-S	Goodrich, Borger	5/16/46	Polyisoprene	Produced for uses as an intermediate material in chlorinated and other chemically treated end-products. Similar in chemical properties to natural rubber.

GR-S Polymers Discussed

FINAL meeting of The Los Angeles Rubber Group, Inc., before the summer recess was held June 11 at the Mayfair Hotel, Los Angeles, Calif., with officials of the United States Rubber Co. as hosts. Speakers were J. L. Brady, rubber technologist, U. S. Rubber synthetic division, Naugatuck, Conn., and William M. Jeffers, former wartime rubber administrator and former president of the Union Pacific Railroad. P. E. Rice, manager of U. S. Rubber's Los Angeles synthetic plant, was in charge of the meeting, and C. Miles Reinke, chairman of the Group, presided.

At a predinner session of the technical group, Mr. Brady discussed available GR-S polymers, their properties, and their value in various applications. Even before the task of getting the polymer plants into production on Standard GR-S had been completed, the speaker said, some attention was being given to the need of special polymers for applications in which rubber could not be satisfactorily replaced with Standard GR-S or other standard polymer then in production. These variations have found acceptance to the point of becoming 50% of the total quantity of GR-S polymer now consumed.

Classified according to feature or to characteristic, Mr. Brady said, these polymers fall into the following categories: variations in viscosity, polymers with enhanced tackiness, non-discoloring and non-staining types, low water absorption polymers, high styrene polymer for better processing and higher cured hardness, super-processing polymer, master batches of black and non-black fillers, and latices. Elliott McLaughlin, of H. M. Royal, Inc., is chairman of the technical group.

Mr. Jeffers, addressing 250 guests at the dinner meeting, declared that the greatest single civilian job in the war was performed by the rubber industry. Without such a high level of performance, he asserted, there could have been no Allied invasion of Europe. Mr. Jeffers predicted Los Angeles will be the rubber capital of the world within a few years, with manufacture of synthetic tires from synthetic alcohol produced from petroleum. He expressed the belief that within two years purchasers of new cars will be specifying synthetic tires, so rapid has been the advance toward their perfection.

The Los Angeles Rubber Group plans two outings during the summer, an all-day picnic and sports program July 27, and a deep sea fishing trip to the Coronado Islands, off the coast of Mexico, August 16-17.

Conn. Group Charter Accepted

THE executive committee of the Connecticut Rubber Group met June 14 at the home of Chairman William J. O'Brien in West Haven. At the meeting a permanent charter for the Group was presented and accepted.

Tentative plans call for a Group outing on September 21, instead of August 17 as originally planned. A committee headed by Ralph Norton is at work on the selection of a suitable site, and prospects of a clam bake have met with a favorable reaction. Plans are being formulated for a fall meeting of the Group to be held either in October or November, which will be announced at a later date.

Lead and Zinc Pigment Shipments Show Decrease

SHIPMENTS of lead and zinc pigment as a group trended downward in 1945, according to a report from the Bureau of Mines. War requirements for pigments continued large for more than half of the year, and civilian needs were inadequately supplied. The down trend is therefore not explained by the lack of demand for these products, but rather by continued shortages in varying degrees of materials that were inadequate in earlier war years. The outstanding shortages in 1945 were of lead, particularly for the manufacture of white lead. Had sufficient quantities of the necessary raw materials been available, the lead and zinc pigments industry would have accounted for much higher tonnages than it did. The competitive titanium pigments established new records both in production and shipments, but continued unable to fill all needs because of plant capacity limitations. White lead bore the brunt of curtailment in the use of lead in 1945 as lead became one of the most critical commodities from an immediate supply point of view. It should be noted that the trends indicated in the figures given below were in many cases due to factors other than those of supply and demand, such as WPB limitations and other restrictions.

The following are the total shipments, in short tons, of lead and zinc pigments and zinc salts by domestic manufacturers in the years 1944 and 1945:

	1944	1945
Basic lead sulfate or sublimed lead:		
White	5,253	2,235
Blue	1,080	1,660
Red lead	53,972	47,381
Orange mineral	284	230
Litharge	138,203	138,798
White lead (dry and in oil)	85,726	51,170
Zinc oxide	140,675	127,955
Leaded zinc oxide	64,395	62,598
Lithopone	142,905	136,161
Zinc chloride, 50° Baume	57,545	56,230
Zinc sulfate	17,156	20,854

The following figures were also given for total shipments, in short tons, of certain lead and zinc pigments to the rubber industry during 1944 and 1945:

	1944	1945
Litharge	3,023	1,864
Basic lead sulfate	268	200
Lithopone	726	977
Zinc oxide	59,518	63,447
Leaded zinc oxide	119	200

Snell Elected A.I.C. President

FOSTER DEE SNELL, president of Foster D. Snell, Inc., 305 Washington St., Brooklyn 1, N. Y., was elected president of the American Institute of Chemists at the annual meeting on May 17 at the Hotel Biltmore, N. Y. Dr. Snell succeeds Gustav Egloff to this office. Joseph Mattiello, technical director of the Hilo Varnish Co., was elected as vice president. At the same meeting the reelection of Lloyd Van Doren, patent attorney, as secretary, and of Frederick A. Hessel, president of Montclair Research Corp., as treasurer was announced. New councilors elected for three years were: Donald B. Keyes, vice president of Heyden Chemical Corp.; Raymond E. Kirk, dean of the Graduate School and head of the chemistry department of the Polytechnic Institute of Brooklyn; and Donald Price.

New York Rubber Group Outing—Blasberg's Grove, June 21, 1946

Rubber Division Fall Meeting

THE Division of Rubber Chemistry will meet with the American Chemical Society at its one hundred and tenth convention, September 9-13, in Chicago, Ill. The technical sessions of the Rubber Division are scheduled for September 11, 12, 13, the exact number of sessions to be determined by the number of papers submitted. Divisional headquarters will be at the Hotel Sherman, where the technical sessions likewise will be held.

Papers dealing with some aspects of the science or technology of natural or synthetic rubbers are solicited for presentation during the Division's Technical program. Abstracts of the papers, consisting of 200-250 words, should be forwarded in triplicate and received not later than July 14 by the divisional secretary, H. I. Cramer, Sharples Chemicals, Inc., 123 S. Broad St., Philadelphia, Pa. In submitting abstracts, information should also be given regarding the laboratory in which the work being reported was carried out, the author's business connection, and an estimate of the time required for presentation of the paper. According to the Society's rule, at least one author of any paper by American chemists must be a member of the A.C.S.

The Rubber Division is again collaborating in sponsoring the High Polymer Forum, and papers intended for presentation before this forum must be received by Dr. Cramer by July 5.

The local arrangements for the Chicago meeting will be in the hands of a committee of the Chicago Rubber Group, under the chairmanship of Francis S. Frost, Jr. The Rubber Division banquet is scheduled for Thursday evening, September 12, at the Hotel Sherman.

The mail ballot for the election of divisional officers for 1946-1947 will follow in July, owing to a delay in printing the biographies of the candidates.

Akron Outing Attracts 500

HENRY F. PALMER, assistant director of chemical laboratories for the Firestone Tire & Rubber Co., Akron, was elected secretary-treasurer of the Akron Rubber Group on June 21, at the Group's annual summer outing at the Seiberling Country Club, Akron, when about 500 technical men from the Akron area assembled for an afternoon and evening of golf, food, and entertainment.

As an officer of the Akron Rubber Group for the coming year, Dr. Palmer joins Jack R. Moore, of Standard Chemical Co., chairman, and Roy M. Vance, of General Tire & Rubber Co., vice chairman.

Roy H. Marston, of Binney & Smith Co. was general chairman of the outing committee and was assisted by sub-committee chairmen including Dave Anderson, Godfrey L. Cabot Co., location; Harold W. Whitacre, Akron Chemical Co., prizes; Wm. McGuire, F. F. Myers Co., golf; Ralph Appleby, E. I. du Pont de Nemours & Co., Inc., tickets; Frank Andrews, Phillips Petroleum Co., entertainment; Tom Stevens, C. P. Hall Co. food; Andy Tomlin, Monsanto Chemical Co., grounds; and Jas. R. Brock, Mohawk Rubber Co., solicitation.

Golfing honors were won by Ross Reid, Goodyear, low gross; Al McMillen, Seiberling, longest drive; Luther Reeves, Binney & Smith, closest approach; C. Damicone, Firestone, least putts.

Following the dinner, 238 door prizes, contributed by more than 130 suppliers and friends of the Akron Rubber Group, were awarded to lucky members.

A.C.S. High Polymer Forum

SIX divisions of the American Chemical Society will cooperate in sponsoring a high polymer forum at the Society's one hundred and tenth national meeting in Chicago, September 9 to 13, according to Herman F. Mark, chairman of the forum committee and professor of organic chemistry at Polytechnic Institute of Brooklyn. The Chicago program will be the second in a series inaugurated at the last Society meeting at Atlantic City in April. The Atlantic City sessions were so successful that it is planned to continue the forum as a regular feature of the Society's national meetings.

The six sponsoring divisions and their representatives are: Physical and Inorganic Chemistry, Dr. Mark; Cellulose Chemistry, H. M. Spurlin, of Hercules Powder Co.; Colloid Chemistry, Maurice L. Huggins, of Eastman Kodak Co.; Organic Chemistry, P. D. Bartlett, of the department of chemistry, Harvard University; Paint, Varnish and Plastics Chemistry, R. H. Ball, of Celanese Corp. of America; and Rubber Chemistry, Howard I. Cramer, of Sharples Chemicals, Inc.

Papers for the forum may be submitted through any of the cooperating divisions. The committee has set July 5 as the closing date for filing titles and 1,000-word abstracts of papers with the divisional secretaries. In addition to Dr. Cramer, of the Rubber Division, the secretaries are: Cellulose Division, John S. Tinsley, of Hercules Powder; Colloid Division, Robert D. Vold, of the department of chemistry of the University of California at Los Angeles; Organic Division, Ralph W. Bost, of the department of chemistry of the University of North Carolina; Paint, Varnish and Plastics Division, William H. Lutz, of Pratt & Lambert; and Physical and Inorganic Division, Henry Eyring, Frick Chemical Laboratory, Princeton University.

Successful N. Y. Group Outing

THE first outing of the New York Rubber Group in five years was held on June 21 at Blasberg's Grove, Hawthorne, N. J., with more than 200 members and guests attending. The location proved ideal, with ample facilities for all activities, and met with the approval of the assemblage. Although the day was cloudy, the showers held off until late in the afternoon when everyone was under shelter and enjoying an excellent shore dinner served in a pavilion. The outing was held to be a most successful one, and a good deal of the credit should go to Peter P. Murawski, of E. I. du Pont de Nemours & Co. Inc., who served as chairman of the outing committee and did most in selecting the site. He was assisted in the work by J. E. Walters, of General Cable Corp., H. Frecker, of United States Rubber Co., and B. B. Wilson, of INDIA RUBBER WORLD.

Activities at the Grove commenced at about 1:00 p. m., and the afternoon was given over to softball, boccie, horseshoe pitching, darts, and other contests, with all participating. However, more than 70 members took the opportunity to play golf at the Orchard Hills Country Club during the afternoon, returning in time to join the others at dinner.

Prizes, in the form of cigarettes, cigars, and liquor, were distributed to contestant winners after dinner. Softball, with W. H. Ayscue, of du Pont, in charge, proved a major attraction, and ended in a 14—5 victory for the team led by M. R. Buffington, of Lea Fabrics, Inc. Because of many substitutions, in each of the teams, it was decided to share the prize, a bottle of liquor, between all participants. Boccie also was highly popular, with over 30 two-man teams competing in a tourney, with Jim Carroll, of R. E. Carroll Co., Inc., in charge. After a grueling struggle, the team of M. D'Asaro, of Wolff-Alport Chemical Corp., and N. A. Perry, of Thermoid Co., emerged victorious. First, second, and third prizes in the baseball distance throwing contest conducted by Howard Linge, of Naugatauck Chemical, went to G. N. Brunt, Flintkote Co., H. H. Abernathy, du Pont, and T. F. Tobin, Acme Backing Corp., respectively. The darts contest, conducted by M. E. Lerner, of *Rubber Age*, saw first prize awarded to Vincent Arch, of the Vulcanized Rubber & Plastics Co., and second prize to Mr. Buffington. First and second prizes, respectively, in the horseshoe pitching contest went to W. F. Lamela, Okonite Co., who also supervised the contest, and to Mr. Abernathy. In the golfing competition, conducted by Ken Soule of Manhattan Rubber Mfg. Division, the handicap ended in a tie which, after being tossed up, gave first prize to S. H. Tinsley, of the R. T. Vanderbilt Co., and second prize to Mr. Soule. The prize for the most pars and birdies went to Eric Engdahl of U. S. Rubber.

Plastics Technology

Field Performance of Forticel[1]

Burton E. Cash[2]

THERMOPLASTICS based on cellulose have proved themselves in many industrial and semi-industrial applications. In these expanding fields, however, there has still been a great need of a molding material combining good dimensional stability with a high order of toughness. Such a material, of course, must also possess many other attributes, such as colorability, good moldability, and an adequate heat distortion temperature. Forticel exhibits this balance of properties to a higher degree than heretofore encountered in any other cellulose-base plastic.

The cellulose propionate base used in making Forticel is manufactured by the reaction of cellulose with propionic acid and propionic anhydride in the presence of a catalyst. This ester was synthesized and studied in the research laboratories of the Celanese Corp. of America many years ago. The production of cellulose propionate, however, became a practical venture only recently owing to the availability of propionic acid from our new chemical plant at Bishop, Tex.

While the availability of some of the necessary raw materials at our Bishop plant is important, it was by no means the determining factor in the selection of cellulose propionate as the base for our new plastic. During the course of continued research in the field of cellulosic plastics the data showed clearly that cellulose propionate offered the best combination of properties among the various esters and ethers studied.

Laboratory Development

The development of the manufacturing technique for the cellulose propionate base and the study of the proper amount and types of plasticizers to be used with this base required many years of basic research. The results of these laboratory findings have already been published.[3] It has been pointed out that Forticel, when molded into laboratory molds, consistently gave parts with a higher surface luster than other cellulosic materials. Basic physical tests determined on standard specimens indicated that it was possible to obtain a very high level of impact strength and at the same time to maintain good surface hardness, stiffness, and tensile strength. In addition excellent moldability and fast machine cycles were also realized. Basic laboratory tests further showed that its water absorption was very low and that its dimensional stability was of a high order. Repeated cyclic aging tests as a measure of stability gave shrinkage values which were among the lowest recorded for a large variety of esters of cellulose.

Field Evaluation

These favorable data assured us that the Forticel formulations developed in the laboratory were ready to be proved out in the field. It is acknowledged that all of the problems dealing with the handling of a new material cannot be predetermined by laboratory testing alone. Therefore a comprehensive program for the field evaluation of Forticel was initiated. It was planned in such a way that the material would be test molded in a wide variety of injection molding machines. Various designs of injection molds were tried out so as to confirm the molding characteristics of the material. Considerable attention was also given to the selection of those items which, because of their intended use and application, demanded physical properties we believe to exist in Forticel. In the ensuing discussion we shall point out the experience obtained to date on the field molding of Forticel and its relation to the original laboratory findings.

Molding

During the course of the field molding of Forticel, careful records of its moldability and machining qualities were kept, and the molded parts were brought back to the laboratory for comprehensive testing of their strength and dimensional stability. Some of the parts that were molded were toothbrush handles, combs, optical frames, and safety goggles, industrial housings, flashlights, saw handles, large screw-driver handles, and fountain pens.

Although Forticel parts molded in the laboratory showed surfaces with a high finish, it was not until extensive field molding had been done that this was recognized to be an important property of the material. Almost without exception, the surface from the die was superior to any other cellulosic material that had been used. Unlike other cellulosic plastics, this high surface luster was maintained over widely varying injection cylinder temperatures and machine cycles.

Another advantage discovered in the field molding which was not evident in small-scale laboratory molding was the ability to shorten machine cycles. A two-cavity flashlight die currently being operated on a 37-second overall cycle was successfully run in Forticel on a cycle of 27 seconds. Another example of cycle reduction was a 16-cavity toothbush die being operated on a 60-second overall cycle. With Forticel this same die ran well in 40 seconds. Cycle reduction cannot be realized on every injection mold. Inserts that are removed manually, in many cases govern the minimum cycle. The cycle is limited in other cases by the rate at which the particular machine and heating cylinder can properly plastify the molding material. Still other jobs of very heavy cross-section or with heavy ribbing must be held under high pressure until cooled or hardened to a certain point. This phenomenon is related to the heat transfer and viscosity-temperature relation of the molding composition, and in these respects Forticel does not appear to differ from the other types of cellulosic compounds. For these reasons cycle reduction was not always possible, but in no case did Forticel require a longer cycle than the standard material being used, and in most cases substantial decrease in molding cycle was achieved.

A point of importance to a molder relates to the compatibility of Forticel with other molding materials. This material can be mixed in all proportions with the cellulose acetate butyrate commercially available today, but cannot be mixed with any other molding material. This characteristic means that Forticel can follow cellulose acetate butyrate through the heating cylinder of the injection molding machine without any costly cleanouts. These facts are important also because they govern the separation and classification of scrap and indicate the care to be exercised in the driers.

Another important observation made during our field work with Forticel was that it retained its good qualities over a wider molding temperature range than the other cellulosics. It was found that an average cylinder temperature deviation of plus or minus 20° F. was tolerable. With other cellulosics, when an average span of plus or minus 10° F. was exceeded, either the surface appearance or its homogeneity suffered. For example, a two-cavity flashlight die was operated first at cylinder temperatures of 410 and 410° F. front and rear zones respectively. Both heating zones were then increased in temperatures by 40° F. The flashlights under both conditions of molding exhibited a surface having a high finish, and subsequent strength and stability tests revealed that both sets of flashlights behaved the same. Another example of this condition was seen on a 16-cavity toothbrush mold where a hard formula of Forticel was molded at cylinder temperatures varying as much as 60° F. with all the other machine conditions held constant except pressure. The resultant brush handles all drilled well on high-speed drilling equipment and had a very good finish. The preceding comments are not to be construed to mean that the control of molding machine variables, particularly temperature, should be relaxed. It is in the interest of good quality production that they always be well controlled. However this wider molding range permits more rapid set-up of new jobs and facilitates the interchange of dies in different machines in a molder's plant.

The relation between the A.S.T.M. plastic flow characteristics of compositions of Forticel and the temperatures required in the molding machine cylinder deserves comment. A table of properties (Table 1) of Forticel formulations developed to date reveals that the plastic flow range is between 302 and 351° F. This does not mean that the molding temperatures are high or that Forticel is difficult to mold. It cannot be emphasized too strongly that the A.S.T.M. flow temperature is not a reliable guide to molding temperature when different plastics are being compared, although it is a reasonably good guide within the compounds of a single plastic. Actually Forticel requires cylinder temperatures equivalent to other cellulose esters having about 18° F. lower A.S.T.M. flow when all other molding variables are held constant.

Machining and Finishing

The machining and finishing of parts injection molded of Forticel present no particular problems. The ability to drill toothbrushes mentioned earlier was a good indication. We have also molded

[1] Presented at 1946 annual meeting, Society of the Plastics Industry, Inc., New York, N. Y., Apr. 24, 1946.
[2] Chief, product development division, Celanese Corp., 180 Madison Ave., New York 16, N. Y.
[3] *Modern Plastics*, Dec., 1945.

TABLE 1. PHYSICAL PROPERTIES OF FORTICEL

Property	A.S.T.M. Method	Unit	Minimum	Maximum	Typical Composition
Flow temperature	D569-43	°C.	150	177	161.5
Specific gravity	D176-42T	Gms./cc.	1.17	1.22	1.19
Rockwell hardness	D229-43	R Scale	63	104	97
Impact strength (Izod)	D256-43T	Ft. lbs./inch of notch			
		25° C. (77° F.)	0.8	11.4	7.8
		—40°	0.7	1.2	0.8
Distortion under heat	D648-41T	°C.	49	66	52
Tensile strength	D638-42T	Lbs. per square inch	2,800	6,000	4,070
Elongation	D638-42T	%	25	43	35
Flexural strength	D650-42T	Lbs. per square inch	4,800	10,000	6,730
Water absorption (24 hrs. immersion)	D570-42	%	1.0	1.7	1.4
Soluble matter lost (24 hrs. immersion)	D570-42	%	None	0.1	None
Weight loss on heating 72 hrs. 82° C. (180° F.)	D706-43T	%	0.3	2.2	1.5
Power factor at one megacycle	D150-42T		0.019	0.032	....
Dielectric constant at one megacycle	D150-42T		3.3	3.5	....

thin-wall optical frames of Forticel and find no difficulty in routing out the lens recesses on high-speed routers even when the frames are molded at quite widely differing temperatures. This feature presents a considerable advantage over other cellulosics being molded into these parts because with them a clean cut can seldom be made unless the molding temperatures are held to a very close tolerance. Other machining operations can easily be done such as turning, punching, and tapping. The surface of the parts out of the die is so fine, in the majority of cases, that it is incapable of being further enhanced by buffing operations. If certain items need to be ashed and polished, the techniques used for cellulose acetate apply. Dies can be designed with smaller gates than are generally found necessary for cellulose acetate. This feature added to the lack of skin formation on moldings of Forticel permits easy separation of the parts from the sprues and runners. Parts molded of Forticel can be cemented as readily as parts of cellulose acetate, but some changes in the chemical constituents of the cements are necessary, because of the differences in solubility of cellulose acetate and cellulose propionate.

Shock Resistance, Dimensional Stability, Shrinkage, Etc.

The very high Izod impact strengths determined in the laboratory (Table 1) on many formulations of Forticel needed field confirmation of their significance. Some of these figures ranged upward of eight foot pounds per inch of notch. It has been found that these high Izod impact values can only be related qualitatively to the impact strengths obtained on a number of items molded in the field. In the impact testing of various types of housings, the moldings of Forticel have, on the average, shown superior shock resistance in drop tests and falling ball tests to other cellulose ester compositions. An anomaly does appear to exist, however, when comparing their shock resistance to parts of ethyl cellulose, particularly at sub-zero temperatures. When the highest order of strength is required, ethyl cellulose is still the toughest cellulosic. Aside from these rather exceptional cases, Forticel will provide the next highest level of shock resistance consistent with the maintenance of other desirable characteristics.

An example of its shock resistance is the ability of flashlights molded of Forticel to pass a cold impact test of 12-inch and 20-inch pounds at a temperature of minus 10° F. Other cellulose ester compositions, when formulated to meet this level of strength, have considerably higher shrinkage characteristics than Forticel upon repeated cyclic aging tests. In addition flashlights molded of these materials will warp and distort under exposure to 175° F. for 24 hours followed by 24 hours at 130° F. and 95% relative humidity. The Forticel flashlights exhibiting these high strengths pass such a heat and humidity test satisfactorily.

It appears, therefore, that the exceptionally high Izod impact strengths indicate that Forticel is a tough thermoplastic. The field molding has shown that a Forticel composition exhibiting an Izod strength of nine foot pounds cannot be considered twice so strong as a cellulose acetate material of 4½ foot pounds Izod impact strength. Our data to date do show, however, that it is the strongest of the cellulosic ester molding materials currently in use.

The laboratory evidence of the good dimensional stability of parts molded of Forticel was thoroughly checked on a variety of field moldings. From a use standpoint it is necessary to consider dimensional stability from two viewpoints. The first is the dimensional changes or shrinkage which takes place over long periods of time. If these shrinkages are excessive, difficulty will be experienced with mounted bezels or panels. The second is warpage or distortion. Warpage of molded parts results as an example in the inability of threaded parts to function properly. A material which resists warpage is very desirable in fabricating large housings and boxes with telescoping lids and bases.

Laboratory accelerated shrinkage tests were carried out on a variety of Forticel moldings. One test comprised five cycles of a combination heat and humidity and dry heat test. Each cycle comprised a 24-hour exposure to 100° F. and 100% relative humidity followed by 24 hours at 140° F. Forticel formulations ranged between 0.4 and 0.6% shrinkage after this cycle test. Ethyl cellulose, which has the best stability of any cellulosic plastic, shrinks between 0.3 and 0.5% in the same test.

Tests for warpage were carried out at high humidities and elevated temperatures. It was pointed out previously that flashlights molded of Forticel passed a combination heat and humidity test of 24 hours at 175° F. followed by 24 hours at 130° F. and 95% relative humidity without distortion. Another part tested was a telescoping box with dimensions of 8¼ by 3 by 1½ inches with a 0.055-inch wall. These boxes both assembled and disassembled were exposed to a temperature of 120° F. and 95% relative humidity for 14 days. At the conclusion of the test the lid and base fit satisfactorily.

Summary and Conclusions

The field performance of Forticel has confirmed the basic laboratory findings. Certain unpredicable dividends were found in the fine surface finish obtained and in the fast machine cycling possibilities of the material. There is little question, because of its excellent balance of properties, that Forticel will prove to be the most important cellulose thermoplastic yet introduced into the plastics field.

New Chapter for SPI Handbook

ADVANCE copies of the fifth chapter of the SPI technical handbook, entitled "Cementing and Assembly of Plastics," will be available for distribution about July 15. The chapter has been written by a four-man committee comprised of John Sasso, of *Business Week*, G. A. Wilkens, of E. I. du Pont de Nemours & Co., Inc., H. F. Wakefield, of Bakelite Corp., and S. Kaufman, of Canadian General Rubber Co., Ltd.

This latest section of the handbook is devoted to basic processes of joining and bonding plastic pieces. The first part covers mechanical assembly by such means of rivets, bolts, screws, and inserts; the second, the cementing of thermoplastics; and the third, the cementing of thermosetting plastics. The practical value of the chapter is enhanced by illustrations as well as by the naming of various cements and bonding agents. The chapter also includes discussion of heat welding and cementing of plastics to other materials.

Only a limited printing of advance copies will be made, and there will be a nominal charge for them. Requests for copies should be addressed to the Engineering & Technical Committee, The Society of the Plastics Industry, Inc., 295 Madison Ave., New York 17, N. Y.

Terson—A New Coated Fabric

USING an entirely new process, Athol Mfg. Co., Athol, Mass., has developed a long-life coated fabric called Terson, designed particularly to meet the exacting requirements of the upholstery field. Terson is made by a process whereby the synthetic resin coating is applied to a woven fiber base of heavy cotton. The coating is then baked on by means of infra-red lamps to form a product with unusual flexibility and long life. The process was perfected under the direction of R. B. Mitchell, the company's chief chemist. Postwar investiga-

tions indicate that the Germans had carried a similar coating process to a high degree of development.

Because of its flexibility, Terson is well suited to a wide range of manufacturing styling. The fabric is made in popular colors and leather grains, retains its original luster, does not become sticky, and is color fast. It is waterproof, slow burning, and can be made mildewproof and fireproof if required. Thousands of flexings will neither crack nor chip Terson, it is claimed, and it can be cleaned easily with a damp cloth. The upholstery fabric has successfully undergone many months of severe tests, including prolonged outdoor exposures in all types of climates from New England to Florida. Rigid laboratory control methods insure a high degree of uniformity in the product.

Many leading upholstery manufacturers are now using Terson for household furniture and other accessories; seats for theaters and other public halls; bus, railroad car, and airplane seats; hospital furniture; garden furniture coverings; and coverings for office furniture and chromium types of furniture.

Plastic Sidewalls for Tires

MANY car owners will soon be able to dress up their cars with new plastic disks which make their tires look like white sidewall tires. Made by Lyon, Inc., from Hercules Power Co.'s ethyl cellulose, these white disks can easily be fitted on the tires at home and are held in place by the hub caps. Being made from ethyl cellulose, the disks are said to be long wearing, easy to clean, and resistant to chemicals, and their appearance and wear-resistant qualities are not affected by either extremely hot or cold weather. Similar plastic sidewalls are also being molded by other companies, who are, however, employing various other plastics.

Hercules Powder Co.

Ethyl Cellulose Plastic Tire Sidewalls

Win Safety Contest

THE Hercules Powder Co., Wilmington, Del., and the B. F. Goodrich Chemical Co., Cleveland, O., were announced as winners of the 1945 Plastic Materials Manufacturers Association safety contest by A. H. Oak, Bakelite Corp., safety committee chairman. Engraved plastic plaques have been awarded the winners. Both companies had perfect safety records with no lost-time accidents during the year, but the Hercules Parlin, N. J., plastics plant placed first for having a greater number of man-hours worked than the Goodrich Niagara Falls, N. Y., plant. Members of the PMMA safety committee are H. F. Gilbert, American Cyanamid Co.; R. L. Simmonds, Celanese Corp. of America; W. R. Diver, E. I. du Pont de Nemours & Co., Inc.; and H. W. Thompson, of the Rohm & Haas Co.

DuBois Addresses Gates Club

THE Gates Technical Club held a dinner-meeting on May 31 at the Edelweiss Cafe, Denver, Colo. An attendance of 140, including representatives from local schools and industries, heard Gaston F. DuBois, vice president of Monsanto Chemical Co. and recent winner of the A. C. S. Perkins Medal, speak on his impression of the American chemical industry.

After some remarks on his earlier experiences in the then-young American chemical industry around the turn of the century, Dr. DuBois discussed the relation of the chemical industry today with other industries. He pointed out that it overlaps all other industries to some extent and laid particular emphasis on the overlapping of the chemical and rubber manufacturing industries. Pointing out that the plastics industry was very close to that of rubber, the speaker expressed his opinion that rubber should be considered as a plastic. He stated his belief that the rubber and plastics industries would in time come together as one industry and declared that it would be wise for the rubber groups to become acquainted with those materials now referred to as plastics. Reviewing the tremendous growth of the plastics industry in the past, Dr. DuBois predicted that it would continue to grow at a very rapid rate, perhaps doubling every five years.

Passing on to a discussion of the relation between government and science in general at the present time, Dr. DuBois reviewed the various Congressional bills on science and expressed the opinion that it would be wiser to have the government money go to the universities and various research foundations to be spent under their direct supervision, rather than to have government agencies controlling the dispersing of these important funds.

The concluding portion of the address was devoted to a discussion of present conditions in industry, particularly as they affect the young technical man. Dr. DuBois made a number of recommendations as to how the young technical man should be handled by industry and how he should conduct himself. Included in these recommendations was rotating the young men through various jobs in the engineering and sales departments and in production as a means of broadening their concepts of industrial methods. The speaker also emphasized the desirability of having the young men enlarge their technical backgrounds and contacts by attending technical meetings, conventions, exhibitions, and trade shows. He also stressed that the young professional men should be kept in contact with management and made a part of management insofar as possible by such methods as group discussions of company policies and plans.

R. I. Group Outing

THE annual outing of the Rhode Island Rubber Club was held at the Wannamoisett Country Club, East Providence, on June 21. About 75 members and guests attended the affair which featured an afternoon of golf and concluded with cocktails and dinner. There were over 60 door prizes, contributed by 39 companies, including an overnight bag, a table radio, several savings bonds, a Schick razor, electric broiler, iron and toaster, a large globe atlas, a Sheaffer pen and pencil set, and liquor.

Prizes awarded in the golf competition were as follows: Low gross was won by F. F. Salamon; low net by Bob Little; the kicker's handicap ended in a tie between J. Manion and C. L. Kingsford; the prize for most fours was tied by A. L. Bryant and H. Simmons; R. A. Walker won the contest for most sixes; and high gross was won by Fred Langorst.

Receives Quartermaster Award

IN recognition of his "vital contribution in the acquisition, accumulation and conservation of strategic raw material which made available a stock-pile of crude rubber so critically needed for the successful prosecution of the war," Russell F. Voelker, of the Field Service Division, Office of the Quartermaster General, has been presented with the Exceptional Civilian Service Award. The presentation was made by Maj. Gen. Thomas B. Larkin, the Quartermaster General. The citation made note of Mr. Voelker's work in devising new methods and procedures for the receipt, inspection, and weighing of rubber at ports of entry, safe storage, dispersement, and preservation of all stocks in this country.

Mr. Voelker was born in Ionia, Mich., Dec. 23, 1898, and educated at Olivet College. He spent five years in the Orient as a buyer for a reed furniture company, during which time he became interested in native rubber growing. In 1925 he became crude rubber buyer and later resident purchasing agent for the Miller Rubber Export Co., which later merged with the B. F. Goodrich Co. After 11 years of rubber purchasing experience, Mr. Voelker, in October, 1939, was appointed supervisor in charge of inspection and storage of the crude rubber accumulated by the Commodity Credit Corp. and stockpiled by the Quartermaster General. He is at present in charge of surveillance of the crude rubber remaining in storage.

RUBBER WORLD NEWS of the MONTH

Highlights—

Record production of rubber products during the first half of 1946 may not be matched by production during the second half of the year because of the delayed impact of the steel, coal, railroad, and other strikes, although the outlook for increased supplies of natural rubber during the last six months is one bright spot in the picture. These increased natural rubber supplies are more or less related to the new agreement effective July 1 with the British, Dutch, and French producers which raises the price of natural rubber from 20¼¢ a pound to 23½¢ a pound for sale to the United States. The War Assets Administration and the Inter-Agency Policy Committee on Rubber, in somewhat unexpected moves, recommended to Congress early disposal of ten GR-I, GR-M, styrene, furfural, and carbon black plants in the first instance and formulation of a policy for the disposal of at least some of the GR-S and butadiene plants during the present session of Congress in the second instance. Maneuvering by leaders of the U.R.W.A. unions in the industry for more concessions on working conditions and/or wages loom as a future, if not immediate threat.

Peak Production More Difficult to Maintain; Government to Dispose of Some Synthetic Plants

Peak production of rubber products which reached a record high in April and then continued high during May, despite the railroad and coal strikes, began to recede somewhat in June by virtue of the effect of the two strikes in the nation's basic industries and those in other industries such as the steel which had occurred earlier. A consideration of many other factors affecting production in the industry, such as raw and component materials supply, labor problems, and market demand for rubber products seemed to indicate that production during the second half of 1946 would not be at so high a level as during the first half of the year. The WAA and Inter-Agency Committee moved suddenly in June to recommend legislation for passage during the present session of Congress for the disposal of many government-owned plants for the production of synthetic rubber and related materials. Negotiations with the British, Dutch, and French producers of natural rubber for a new price agreement effective July 1 through December 31 were held in London, and an increase from 20¼c a pound to 23½c was announced June 20.

General Industry Situation

In spite of the high rate of production of rubber products for the first four months of 1946 and increasing shortages of component materials, the industry has been able to obtain enough of its major raw material and even set aside a little extra for the day when the maintenance of peak production will depend directly on the amount of rubber available for processing, even though component material shortages may become more critical at about the same time. According to one authority, taking January, 1946, as 100 for both the index of rubber entering the processing stage and also the index for finished product production, in February, rubber entering the processing stage was 96.3 and the finished product index was 95.7, in March the former was 112.6 and the latter 108.7, and in April the respective figures were 112.7 and 111.0. While the difference is fairly small, it does show that in-process inventories were in a stronger position at the end of April than they had been in January.

Speaking before the Advertising Club of Boston on May 28, John L. Collyer, president of The B. F. Goodrich Co., said that although American rubber consumption for the first quarter of 1946 ran 46% ahead of the 1940 level, interruptions in supplies of some 2,000 different materials the industry uses may make impossible maintaining this "outstanding record of reconversion."

Mr. Collyer told members of the Advertising Club that the industry had "proved it could turn out tires at a rate of 85 to 90 million a year—about a third-again as many as the highest prewar rate." However, he said, the industry has been "living from hand to mouth" with respect to supplies of coal, textiles, steel for bead wire, chemicals, and other components "whose production or delivery are so subject to stoppage because of the instability of the industrial situation today."

"What has happened," he explained, "is that inventories of raw materials have been all used up during the coal, steel, and other strikes. Should these dislocations continue, the rubber industry cannot be expected to maintain the fast pace it set in getting into peacetime production. In fact, if suppliers do not get back into full production very soon it will be necessary for the rubber industry to reduce substantially its scale of operations, which would affect the employment of tens of thousands."

The Goodrich head estimated first-quarter rubber consumption of 237,852 tons, against 162,593 for the period of 1940; and tire production, all types, at 19,967,057, against 15,409,000 in the first quarter of the last full peacetime year.

Even if there is no marked decline from the present high tire-production levels, it will be "near the end of this year before a motorist can expect to walk into a tire store and get as many tires of his favorite brand and size as he wants without waiting," Mr. Collyer said. All large tires may be decontrolled by mid-summer and passenger-car tires early next year, he added.

Tires figured in the news in several ways during June, particularly in connection with the Detroit Automotive Golden Jubilee, at which F. A. Seiberling, chairman of the board of the Seiberling Rubber Co. and a pioneer in the rubber industry, broadcast a salute to the pioneers of the automotive industry over station WJR on May 31.

"Few enterprises are more interdependent than the automobile and rubber industries," Mr. Seiberling stated. "The success of one virtually measures the prosperity of the other. To say that I shared in the ups and downs of the automobile industry—that I was able to minutely measure the caliber of the men who made it—is merely making a statement of plain, simple fact.

"The inherent ability and foresight of these men not only resulted in the establishment of a great *industry*, but of a distinctively American way of *doing* things industrially. They forged the measuring stick by which industrial progress throughout the world is gaged. . . .

"I am rightfully proud of the share which we of the rubber industry have contributed to the growth and development of the motor car and truck industry. This would be a less jubilant jubilee if pneumatic tires had not been able to take a major part of the shock of growing pains in America's motor transport development."

After reviewing the progress of tire development during the past 50 years, Mr. Seiberling concluded with the comment that we Americans face stupendous problems as we pass out of active war into relative peace.

"The great inheritance of the pioneers of this industry lay in their *courage* and their *willingness to work*. America must recapture that spirit—that zeal. If we do we will go forward to new heights of plenty, of just rewards and of the hope of universal happiness in Peace on Earth."

Another industry leader, R. P. Dinsmore, vice president of the Goodyear Tire & Rubber Co., spoke on "Goodyear's Contribution to the Development of the Automotive Industry" at a dinner at the Recess Club in Detroit on May 28, held in connection with the air cargo research department of Wayne University and the Detroit Golden Jubilee Celebration. Dr. Dinsmore first reviewed the development of the automobile tire with special reference to his company's work in this field, including clincher and balloon tires, compounding advances, tire cords, etc., and then went on to point out that it was not too often that the whole history of an industry has to be rewritten in two or three years because of a violent upset in the supply of its basic raw material.

"There have been a great many controversial statements made about who contributed the first and most of the synthetic rubber development," Dr. Dinsmore said. "I believe that such statements fail to supply the greatest credit of which is due the individual elements of the industry because of their willingness to get together and supply all the information and experience which they had available. The fact is that they did this, and that the result was so successful that it speaks for itself.

"There is a great interest generally in the possibilities for tires which have still longer life than those at present, and which in fact may last as long as the average man keeps his car, and even up

to 100,000 miles. In thinking of this possibility, it is interesting to remember that the chief constituents of a tire: namely, the fabric, the reinforcing compounds which are chiefly carbon black, the organic accelerators, and protective agents, are all synthetic material capable of modification and improvement by human efforts. It is now significant that the remaining major material; namely, the rubber, has been made by synthetic processes, and while it is not yet completely equal to natural rubber, it would be a reversal of our whole experience if it did not ultimately become superior. Natural rubber itself has many drawbacks. It has less elasticity and is more perishable than ideal material. I think that we can expect therefore that improved rubbers will be made within a reasonable period, that superior synthetic fibers and cords will be developed, and that improved carbon blacks, or other reinforcing materials, will be brought along also. By such improvements we can reduce the heat developed in a tire which must be sturdy enough to wear for the long mileages which have just been indicated. The delays in these developments are not caused by unwillingness on the part of tire companies to improve their product—this is rejected on the basis of past performance. The greatest difficulty is that we must create the improvements in the materials themselves to a large extent before we can incorporate them into an improved tire. However, the industry has shown its willingness and ability to attack such difficult problems, and I feel quite sure that the possibilities of success are even brighter today than they have ever been in the past," Dr. Dinsmore concluded.

Reports on Tire Production and Use

A warning note was sounded by The Rubber Manufacturers Association, Inc., and some of the major tire manufacturers during June to the effect that hot weather will take its annual toll of 6,000,000 tires this summer—more than a full month's production even at the present record production rate that tires are now being made.

This estimate was considered to be a minimum, the normal loss. Because a great proportion of the casings now in service are worn from punishing use during the war years, these losses may even run up to 8,000,000 or more when American motorists begin a record vacation driving season during June, July, and August, it was said.

Although some time between September and the first of next year the major backlog of passenger-car tire demand may be satisfied and inventories in the dealers' hands, as well as manufacturers' will accumulate from that time on, this state of affairs will be after the heavy summer driving season, and the strictest attention to all of the basic rules of tire care is called for if passenger cars are to be kept in service.

To this end and with a view of holding to the minimum the staggering toll of highway accidents recently highlighted by the President's Safety Conference, RMA urged all drivers to avoid continuous high speeds, check air pressure regularly and keep it constant to avoid destructive flexing of fabrics within the tire, and recap, when treads become smooth, so as to keep cars rolling until new tires become available again in good supply. Barring interruptions of production because of shortages of materials like textiles and steel bead wire, the industry expects to produce nearly 70,000,000 passenger-car tires this year. This rate should mean tires for everyone at this year's end, the Association said.

In its regular report on tire production RMA stated that passenger-car tire production continued its steady climb to new peacetime records in April, reaching a total of 5,514,751 units.

This output represented a 3.85% gain over March production and brought the total for the first four months to 20,115,514 units, as compared with 6,363,854 units for the same period last year. Production of truck, bus, and passenger-car tubes gained 4.7% in April. Output of truck and bus casings, which in the larger sizes are now in nearly normal supply, declined 0.54% from March to 1,368,157 units. The complete production figures are shown in the accompanying table.

A proposal to install 60-day inventory controls on high-tenacity rayon yarn, cord, and cord fabric in the hands of rubber manufacturers was made to the High-Tenacity Rayon Producers Industry Advisory Committee on June 11 by the Rubber Division of the Civilian Production Administration. The Committee unanimously approved the proposal. CPA officials cited evidence of maldistribution of high-tenacity rayon yarn in the hands of rubber manufacturers and as a result of this situation, they said, some companies cannot make all the tires they are now permitted to make with rayon cord under the pattern established by List 15 of Appendix 2 of R-1. At the same time other companies have more rayon than they need. It is contemplated that by July 1 the proposed new control will take effect.

The CPA, on June 15, also limited the tire manufacturers to a 30-day supply of GR-S. This limitation was imposed because of the growing shortage of GR-S resulting from the current record tire production. Preliminary figure for GR-S production during April was 54,885 long tons, but consumption during that same month was 59,789 tons. The final figures for GR-S production during March were 51,257 tons, and consumption was 62,292 tons. At the end of March total GR-S stocks on hand were 112,567 tons and at the end of April 96,241 tons. Exports of GR-S dropped sharply in April to 11,422 tons as compared with 17,083 tons in March.

Preliminary figures for the production of the other synthetic rubbers as compared with the final figures for March and including similar figures for consumption during these same periods follow: GR-I production during April, 7,069 tons, against 5,390 tons for March; consumption, 6,569 tons during April, against 8,030 tons in March. GR-M production during April was 3,513 tons, contrasted with 3,242 tons in March; consumption, 3,477 tons, against 3,492 tons in March. Buna N production in April totaled 547 tons, against 474 tons in March, and consumption in April was 413 tons, against 400 tons in March. Stocks on hand of these synthetic rubbers at the end of April were: GR-I, 14,056 tons; GR-M, 7,613 tons; and Buna N, 3,869 tons.

Tire Price Increases Granted

The increase in the price of tires which OPA has been studying for the past several months was finally announced, first, on June 11, as an overall increase of 4½% allowed in manufacturers' ceiling prices for tires sold to vehicle makers to put on new automobiles, trucks, and other motor vehicles, and, second, on June 18, as an increase of 3.3% in ceiling prices for passenger-car and motor-

Estimated Automotive Pneumatic Casing and Tube Shipments, Production, and Inventory, April - March, 1946—First Four Months, 1946-1945

	Original Equipment	Replacement	Export	Total Shipments	% of Change from Preceding Month	Production during Month	% of Change from Preceding Month	Inventory End of Month	% of Change from Preceding Month
Passenger Casings									
April, 1946	774,663	4,751,841	57,136	5,583,640	+5.32	5,514,751	+3.85	2,326,918	—2.37
March, 1946	516,187	4,738,609	46,835	5,301,631		5,310,273		2,383,421	
First Four Months, 1946	1,922,370	17,508,303	168,853	19,599,526		20,115,514		2,326,918	
1945	92,270	6,520,961	64,747	6,677,878		6,363,854		725,180	
Truck and Bus Casings									
April, 1946	330,106	1,004,308	71,295	1,405,709	+6.54	1,368,157	—0.54	976,873	—3.16
March, 1946	213,357	1,047,801	58,200	1,319,358		1,375,571		1,008,780	
First Four Months, 1946	963,603	3,803,970	248,631	5,016,204		5,227,447		976,873	
1945	2,269,082	4,639,193	51,671	6,959,946		7,004,409		786,057	
Total Casings									
April, 1946	1,104,769	5,756,149	128,431	6,989,349	+5.56	6,882,908	+2.95	3,303,791	—2.61
March, 1946	729,544	5,786,410	105,035	6,620,989		6,685,844		3,392,201	
First Four Months, 1946	2,885,973	21,312,273	417,484	24,615,730		25,342,961		3,303,791	
1945	2,361,252	11,160,154	116,418	13,637,824		13,368,263		1,511,237	
Passenger, Truck and Bus Tubes									
April, 1946	1,112,845	4,842,499	123,604	6,078,948	+7.61	6,114,247	+4.70	4,189,533	—7.29
March, 1946	764,409	4,775,924	108,523	5,648,856		5,839,622		4,518,903	
First Four Months, 1946	2,970,745	17,027,134	403,092	20,400,971		21,467,657		4,189,533	
1945	2,385,739	10,501,297	75,369	12,962,405		13,161,311		2,696,049	

cycle replacement tires at wholesale and retail levels and an increase in manufacturers' and wholesalers' ceiling prices for truck, bus, and industrial replacement tires amounting to 1.4% of the existing retail ceilings. (See page 546 for complete details.)

OPA Lauds Retread Committee

Certificates of meritorious service were presented to members of the Tire & Tube Repair Materials Industry Advisory Committee at a dinner at the Statler Hotel, Washington, D. C., on June 5, by the Office of Price Administration. This committee, established in January, 1945, has advised the OPA on problems arising in connection with the administering of ceiling prices on camelback and repair materials for tires and tubes.

The certificates presented only for outstanding service, carried the inscription that, "This Committee, by its sound advice and devotion to the welfare of the nation, has helped the economy withstand the strains of global war and preserve its stability for future generations of Americans."

James G. Rogers, Jr., deputy OPA administrator, principal speaker at the dinner, paid tribute to the high degree of industry-government collaboration attained by this Committee. G. W. Strasser, price executive, Harry R. Hinkes, chief counsel, and George Abrams of the rubber and chemicals price branch, added their appreciation of the Committee's cooperative efforts on behalf of price control. Arthur F. Schalk, head of OPA's tire and tube price section, who has worked closely with the Committee since its formation, presided. On behalf of the Committee, G. F. Oliver, vice chairman, and John J. Wolfe, secretary-treasurer, expressed appreciation of the awards. Members of the Committee are: Ernest Leach, chairman, General Tire & Rubber Co., Akron, O.; G. F. Oliver, vice chairman, Oliver Tire & Rubber Co., Oakland, Calif.; John J. Wolfe, secretary-treasurer, RMA, New York, N. Y.; M. J. Way, Miller Rubber Co., Akron; T. J. Bagley, R. M. Hollingshead Corp., Camden, N. J.; Albert Buxbaum, Buxbaum Co., Canton, O.; B. C. Eberhard, Goodyear Tire & Rubber Co., Akron; J. W. Hodgson, Firestone Tire & Rubber Co., Akron; Harry L. Kincade, United States Rubber Co., New York, and H. J. Cope, Cascade Rubber Co., Cuyahoga Falls, O. Certificates were mailed to the family of E. A. Schneider, deceased, and Walter L. Clarkson, former members of the committee.

Natural Rubber Price Agreement

Negotiations with the British, Dutch, and French natural rubber producers and United States representatives on the future price of natural rubber following the expiration on June 30 of the present agreement began in London on June 3 and resulted in an announcement on June 20 by the State Department in Washington that the United States had agreed to buy 145,000 long tons of rubber from these producers at a price of 23½¢ a pound, f.o.b. Far Eastern ports, during the second half of 1946. This is an increase of 3¼¢ a pound over the agreement which ended on June 30. Determining factors in the increase were said to be the continuing shortage of natural rubber in relation to demand and present high costs of producing natural rubber in the Far Eastern areas. The governments concerned will support the continuance of international allocation of natural rubber by the Combined Rubber Committee during the six-month period. It was said that beginning July 1 the United States will be able to purchase rubber from Malaya without its first being purchased by the United Kingdom and then resold to the United States. Arrangements for procurement in Netherlands and French Far Eastern territories are still being discussed. Present arrangements for the purchase of rubber from Ceylon will continue until the end of September, it was added.

A report from Ceylon which appeared in *The New York Times* on June 7, by George E. Jones, stated that the rubber growers there were concerned regarding the future because of the higher labor costs as compared with those in the liberated Far Eastern areas and also because of the threat of the United States synthetic rubber industry to the world market for natural rubber.

Preliminary figures for imports of natural rubber into the United States for April were 19,847 long tons, a decided drop from the 35,348 tons received during March. Consumption rose to 16,956 tons, as compared with 12,792 tons in March, but stocks on hand at the end of April rose to 182,789 tons, as compared with 180,088 tons. It is of interest to record the fact that the total consumption of both natural and synthetic rubber in the United States in April was about 87,200 tons, which represents an annual rate of almost 1,050,000 tons.

Carbon Black Industry Problems

The carbon black industry came up for investigation by the Federal Trade Commission during June. Hearings held in New York and Charleston, W. Va., in the case of the Carbon Black Export, Inc., of New York, were for the purpose of determining whether the association and its officers and members had engaged in practices and entered into agreements in violation of the Webb-Pomerene Export Trade Act. The investigation is part of a series of such investigations of export associations operating under the Webb-Pomerene Act, now being conducted by the FTC.

During the testimony it was brought out that foreign prices on carbon black during the period from 1934 to late 1937 were controlled legitimately, in accordance with terms of the Act, but witnesses for the corporation denied that domestic prices were controlled. Principal witness for Carbon Black Export was Carl E. Kayser, president of the corporation from its formation in 1933 until the end of 1945. Mr. Kayser is now associated with the Columbian Carbon Co.

Carbon black producers were also involved in a three-way controversy with suppliers of natural gas and the OPA during June. One of the suppliers of natural gas on May 31 notified its carbon black users that under a ten-day cancellation clause in their contracts, it would supply no more gas at prevailing ceiling prices after June 10. This action resulted in a demand that the OPA increase the ceiling price on both natural gas and the carbon black made from it. It is understood that the gas supply to the carbon black producers in the original case was not discontinued on June 10, and on June 22 the OPA announced that manufacturers of carbon black may enter into contracts for natural gas at ceiling prices already applicable to pipeline purchases for use as heat, light or fuel, effective July 1. (Amendment 24 to RMPR 436—Crude Petroleum, and Natural and Petroleum Gas). This action should settle half of the problem since it prevents the diversion of gas supplies at the expense of carbon black manufacturers by permitting the same prices for both classes of purchasers. There remains now the problem for the carbon black manufacturers to obtain an increase in the ceiling price of their product in view of the increased raw material cost.

Government to Dispose of Some Synthetic Plants

The Government, through the War Assets Administration and the Inter-Agency Policy Committee on Rubber moved rapidly during June to encourage action by Congress before the end of its present session on the disposal of 10 specialized plants used in the wartime synthetic rubber program, and the establishment of a policy for the disposal of butadiene and GR-S copolymer plants. The Inter-Agency Committee report in connection with the latter emphasized that unless disposal policy is formulated in this session of Congress, it will be legally impossible to dispose of any of the government-owned butadiene and copolymer plants costing more than $5,000,000 until Congress convenes early in 1947. The Committee does not look with favor upon these plants remaining in government hands for the next eight months, feeling that much may be accomplished toward private ownership of parts of the system in the months immediately ahead. The 10 specialized plants covered by the WAA report represent more than one-fourth of government-owned synthetic rubber plants costing more than $5,000,000 and also more than one-fourth of the total government investment in such plants. They represent the entire Butyl, or GR-I, capacity of the country, more than 90% of the styrene capacity, 86% of the neoprene, or GR-M, 66% of the furfural and 8% of the carbon black.

The WAA Report

The report of the War Assets Administration, made public June 10 and entitled "Synthetic Rubber Plants and Facilities—First Supplementary Report of the War Assets Administration to the Congress," first referred to the January 14, 1946, report of the Surplus Property Administration and the fact that this interim report did not present a definite plan or program of disposal since the WAA was awaiting the report of the Inter-Agency Policy Committee. Following the first report of the Inter-Agency Committee on February 10, 1946, it was possible to consider recommending the disposal of the plants producing Butyl and neoprene rubbers, styrene, furfural, and carbon black. Since under the Surplus Property Act none of the plants recommended by the Inter-Agency Policy Committee for disposal can in fact be sold until 30 days after a disposal plan has been presented to Congress by the War Assets Administration, WAA has decided to present such a plan covering only those plants named in the Inter-Agency Policy Committee's first report. The purpose is to prevent any delay in actual disposal of the plants named, it was said.

The plants costing $5,000,000 or more covered by this report, all of which are recommended for early disposal, are listed

in Table I. This table includes 10 plants (two Butyl, one neoprene, five styrene, and two chemical), representing an aggregate government investment of $182,000,000.

Under "Reasons for Recommending Early Disposal," the report points out that Butyl and neoprene are special types of synthetic rubber, the production of which is separate from the complex scheme of governing the inter-relations of the plants and the disposal of their output in the GR-S program. These special rubbers have qualities which promise to provide them with a somewhat special peacetime market, it was added. Styrene, while it is an essential raw material for GR-S, is also a multiple-purpose chemical. The market prospects are such that the plants producing it are deemed capable of disposal on favorable terms at the present time without interfering with their contribution to the GR-S program either in the short or long run. Furfural, which among a variety of uses is used in the manufacture of butadiene, and carbon black also have a market position which favors the early disposal of plants producing them without interfering with present production or future plans for the synthetic rubber industry, it was also stated.

TABLE 1. GOVERNMENT-OWNED BUTYL, NEOPRENE, STYRENE AND SPECIALTY CHEMICAL PLANTS COSTING OVER $5,000,000

Type of Plant	Operator	Location	Approx. Cost ($ Million)	Design Capacity (Long Tons) (Year)
Butyl (GR-I)	Standard Oil Co. of New Jersey	Baton Rouge, La.	25.9	38,000
	Humble Oil & Refining Co.	Baytown, Tex.	25.9	30,000
			51.8	68,000
Neoprene (GR-M)	E. I. du Pont de Nemours & Co., Inc.	Louisville, Ky.	38.4	60,000
				(Short Tons) (Year)
Styrene	Carbide & Carbon Chemical Co.	Institute, W. Va.	9.8	25,000
	Dow Chemical Co.	Los Angeles, Cal.	12.6	25,000
	Dow Chemical Co.	Velasco, Tex.	17.8	50,000
	Koppers Co., Inc.	Kobuta, Pa.	18.8	37,500
	Monsanto Chemical Co.	Texas City, Tex.	18.3	50,000
			77.3	187,500
Chemicals				(Lbs./Year)
Furfural	Q. O. Chemical Co.	Memphis, Tenn.	5.0	24,000,000
Carbon black*	United Carbon Co.	Odessa, Tex.	9.5	41,000,000

* The government owns five other carbon black plants, each of which as shown below cost less than $5,000,000; these are also recommended for early disposal.

Operator	Location	Approx. Cost ($ Million)	Design Capacity (Lbs./Year)
Cabot Carbon Co.	Guymon, Okla.	2.2	15,000,000
Columbian Carbon Co.	Seagraves, Tex.	2.1	12,000,000
Continental Carbon Co.	Sunray, Tex.	2.0	20,000,000
C. E. Johnson	Monument, N. Mex.	2.0	15,000,000
Panhandle Carbon Co.	Eunice, N. Mex.	1.7	15,000,000

Butyl Rubber

In connection with the recommendations for the disposal of the government-owned Butyl plants, it was mentioned that both of the two plants obtain their principal raw materials, isobutylene and isoprene, from adjacent refineries which are owned by the plant operators; the operations are therefore closely integrated. The isobutylene extraction units are integral parts of the Butyl plants, but they nevertheless are so designed as to prepare feedstock for use in adjacent government-owned butadiene plants. There is an isoprene unit in conjunction with the Baton Rouge Butyl plant, and isoprene from this unit is shipped by tank car for use at the Baytown, Tex., unit.

Sale or lease of either Butyl plant to a new operator would necessitate the negotiation of new arrangements for the supply of necessary feedstock. In addition the steam used at the Baton Rouge plant is supplied by a large government-owned generating plant which provides steam for all of the government-owned plants in the area. Should a new operator be unsuccessful in negotiating satisfactory terms with the adjacent refneries for the supply of feedstocks and utilities, entirely new arrangements would have to be made. In the case of the Baytown plant, there are refineries in the area owned by others than Standard from which supplies might be obtained by construction of necessary pipelines. However there are no other refineries in the Baton Rouge area; hence a new operator of that Butyl plant, if unsuccessful in negotiating with Standard Oil, would have to consider shipping feedstocks to the plant by rail or water or making a substantial additional investment to permit production of feedstock from petroleum fractions or natural gas.

Because of the integration of the isobutylene extraction units with adjacent butadiene plants, new operators would also have to negotiate with the butadiene plant operators for the disposal of Butyl plant by-products as butadiene plant feedstock. The inherent economy of processing butylene purge streams from the butadiene plants in Butyl plant equipment would also indicate the desirability of making arrangements to contine the exchange of these streams. These circumstances present many complications and may limit disposal possibilities, at least for the Baton Rouge plant, the report states.

Domestic production of Butyl rubber for 1946 is estimated at about 70,000 tons, and some additional amounts may be imported from Canada. The potential short-run market is greatly in excess of probable production, and there are excellent prospects for the use of the product even after supplies of natural rubber become available. In spite of operational and technological difficulties 47,000 long tons of Butyl rubber were produced during 1945. The manufacturing costs during that year averaged approximately 16¢ a pound exclusive of plant amortization charges, as compared with a selling price of 18.5¢ a pound. Some further reduction in manufacturing costs can be anticipated as the production rate approaches design capacity.

While the future position of Butyl in competition with natural rubber, when the latter becomes plentiful, cannot be confidently predicted, its special qualities, particularly for inner tubes, give promise of a substantial market on the basis of its cost in comparison with the range of natural rubber prices which is likely to be established, the WAA report points out.

The existing patent arrangements for Butyl rubber are contained in a License Agreement of May 15, 1942. Since all research on Butyl was financed and conducted solely by Standard Oil during the war, the government has no patent rights other than the royalty-free license granted in the agreement. Except for a commitment to grant future licenses under its patents, virtually complete patent control, therefore, continues to be vested in the Standard Oil Co.

In case of sale or lease of the Butyl plants to a postwar operator, the agreement provides that he will be licensed under Standard's Butyl patents at royalties on a sliding scale based upon the total cumulative previous and present production of Butyl by all producers, subject to a ceiling of 5% of the sales price. The purchaser or lessee is also entitled to receive technial information utilized in the plants up to the time of sale or lease, without cost.

Provision is made for terms under which future know-how will be supplied to a new operator by Standard Oil. The latter also provides an immunity from suit under its foreign patents with respect to the sale abroad of Butyl products by its licensee, and provision is made for the defense by Standard Oil at its own expense of any infringement suits and for immunity against loss under any claims or, damages up to the amount of the royalty payments made by the licensee.

The Butyl patent rights of Standard Oil include all patents of Standard Oil Co. (N. J.) based on inventions made prior to the end of the war period, and with respect to Humble Oil Co. all its Butyl patent rights which are acquired or owned by Humble prior to December 31, 1948. In return for the license and technical information received, a new operator is required to grant to Standard Oil an irrevocable, royalty-free license under all of his Butyl patents issued subsequent to March 25, 1942, the date of the anti-trust Consent Decree against Standard Oil. If he elects to accept future know-how and patent licenses from Standard, he must grant licenses to Standard under all future patents that he may acquire during the period of his license and must also furnish to Standard his own technical information relating to Butyl manufacture, at cost. To aid disposal to a new operator it may be desirable to explore the possibility of securing some modification of the present provisions of the Butyl agreement with respect to the exchange of future know-how between Standard Oil and a prospective licensee, it is stated.

Also, the leases on the Butyl plants give the present operator a right of first refusal for a period of 90 days during which the plants must be offered to him at a price or rental equal to the best

offer received from others. The operating agreement with the operator provides that cost data be held in confidence, a provision for which a waiver should, if possible, be obtained in order that other bidders may become sufficiently well informed concerning the operating facts, the report adds.

Neoprene

The special oil- and chemical-resistant characteristics of neoprene made it necessary to expand prewar capacity to meet the war program. The government purchased the Louisville plant being constructed by the du Pont company, financed its expansion to 60,000 long tons per year at a cost of $39,000,000, and leased it for operation to the company. Actual production in 1945 was 36,732 tons. Besides the government-owned project, there is a privately owned plant at Deepwater, N. J., which has an annual rated capacity of 9,750 tons. Thus the government now owns 86% of the total neoprene capacity of 69,750 long tons a year.

The acetylene used in the production of neoprene is received by pipeline from an adjacent generating plant owned partially by the government and partially by the National Carbide Corp. Steam generating facilities were constructed as a part of the plant, but electric power is purchased. This neoprene plant is divided into four parallel units, with common auxiliaries and raw material preparation facilities. Because of the explosive character of the vinyl acetylene which is formed, the producing units are separated by very heavy reinforced concrete barriers, but the units are all tied together laterally to permit cross-overs of intermediates for the purposes of providing operating flexibility.

The Louisville plant is now in operation, but on a reduced scale since heavy wartime demands for neoprene have fallen off, the report reveals. During the war many new uses were found for neoprene, and the price dropped from $1 per pound to 65¢ and finally to the present ceiling price of 27½¢. It is estimated that demand for neoprene in 1946 will be in the range of 35,000 to 45,000 tons, which, taking into consideration the capacity of the privately owned plant, will require the operation of the Louisville plant at approximately one half of its designed capacity. The privately owned plant capacity at Deepwater, N. J., which would compete with the output of the Louisville plant, is an important factor in case of disposal to a new operator.

The principal element in the production cost of neoprene (exclusive of amortization) is the price of acetylene, which in turn depends upon the delivered price of calcium carbide. During 1945 the cost of producing neoprene averaged slightly in excess of 22¢ a pound, exclusive of plant amortization, interest, and Washington office expense, but present low production rates have increased this cost substantially. Depending upon the rate of production and the cost of acquiring acetylene, a return of neoprene production costs in the postwar period to the level reached in 1945 may well be possible.

Even if manufacturing costs are not reduced to the 1945 level or below, there is every reason to believe that a considerable market for it will exist in competition with natural rubber at a lower price. Neoprene is today a better and much cheaper product than it was before the war, when it had a small market even at a very high price, and research now in progress is likely to improve its quality and extend its uses. Du Pont estimates that, if natural rubber should sell in the future at 15¢ a pound, approximately 30,000 tons of neprene could be sold at 27½¢, the current price.

The process used in the Louisville plant is a du Pont process, and virtually all patents in this field are controlled by the du Pont Company. The patent licensing arrangements in Rubber Reserve's operating agreement of July 1, 1942, with du Pont provide that, should the Louisville plant be sold to a new operator, du Pont will, at the request of Rubber Reserve, negotiate with the new operator for a license under the du Pont patents at reasonable terms and conditions, but in no event upon terms less favorable than then being offered by du Pont to any other party and in no event at a royalty rate in excess of 5% of the operator's net sales price of neoprene. Before disposal, information should be obtained from du Pont concerning the terms, conditions, and royalty rates which will be charged a prospective purchaser or lessee of this plant.

If the plant were to be acquired by du Pont, that company would occupy the position of sole producer of neoprene. Whether this position would be permissible is a question for review by the Department of Justice. It has been suggested that the opportunities for disposing of the plant might be widened and at the same time some competition introduced by disposing of the Louisville plant to more than one operator. Although the plant is divided into a number of operating units, the Office of Rubber Reserve regards the suggestion as impracticable on technical grounds.

The existing lease is for five years beginning September 2, 1942, but will terminate upon the termination of a concurrently made operating agreement with du Pont. The lease does not provide the operator a right of first refusal. There is, however, a special provision thereafter, which seriously affects the disposal picture. Under this provision sale or lease for private operation must be effected at public auction to the highest qualified bidder. The Louisville plant cost approximately $39,000,000, and even if sale were to be contemplated at half this figure, the cash payment required of a qualified bidder would be large enough, in case of a prospective purchaser, to bar all but those having very large financial resources, the WAA report states.

Furfural

The requirements for this solvent, used in the manufacture of butadiene, were met in part by furfural produced in a government-owned plant built at Memphis, Tenn., (see Table 1) to supplement existing facilities in the United States. The use of furfural in this country was developed largely through the efforts of the Quaker Oats Co., which controls nearly all the patents relating to production. Prior to the war this company was the sole producer, its plant at Cedar Rapids, Iowa, having a capacity in the neighborhood of 12,000,000 pounds a year. Taking into account the capacities of the two plants, approximately two-thirds of the national furfural capacity is now government-owned.

Furfural has a variety of uses, including petroleum refining, butadiene extraction, gas purification, synthetic resins, rosin purification, and the manufacture of synthetic organic chemicals. Consumption for uses other than butadiene has recently been about 12,000,000 pounds annually, of which the bulk was for petroleum refining. This application, which before the war required about 2,500,000 pounds, largely for lubricating oil manufacture is expected to show a large increase owing to new methods of using furfural in the production of chemicals from petroleum. Annual consumption may rise as high as 24,000,000 pounds; thus it appears that the Memphis plant possesses a market for a substantial fraction of its capacity, according to the WAA. Furfural is also produced abroad in Russia, Sweden, and France, but there is an import duty of 25% ad valorem, which is sufficient to avoid any serious competition from these sources.

Furfural is made by a sole producer under his own patents, of which, however, the basic patent expires during the present year. Its production from waste materials was well developed and carried out on a substantial scale before the war by a concern which made aggressive efforts to find new applications and to increase the output. Although in accordance with the general aims of the Surplus Property Act the disposal agency should attempt to interest other chemical concerns in sale or lease of the plant, it is by no means clear whether this action would be possible. In case of sale or lease of the Memphis plant to a new operator, the disposal agency should assist him in obtaining patent licenses and technical information upon reasonable terms, the WAA report explains.

The lease to the present operator provides him the right of first refusal. Any disposal arrangement with the present operator would raise a question for the Department of Justice by reason of placing him in the position of sole producer, it was added.

Carbon Black

The total expansion in facilities for the production of carbon black during the war increased the capacity of the industry from 630,000,000 pounds annually in 1940 to about 1,500,000,000 pounds a year by the end of 1945. Only a minor fraction of the increase, 119,000,000 pounds of annual capacity in six completed plants, was financed by the government at a cost of somewhat over $20,000,000. These plants, listed in Table 1, are now in operation and have been offered for sale or lease by the WAA. Only one cost the government more than $5,000,000: namely, Plancor 2279 at Odessa, Tex.

In the immediate postwar period annual U. S. domestic requirements for carbon black are estimated by the WAA at 700 to 900 million pounds, depending on the prevailing ratio of synthetic to natural rubber. The supply and consumption of reclaimed rubber will have an influence, since reclaimed synthetic will contain a higher proportion of carbon black.

Prior to the war the United States supplied practically all world requirements for rubber grades of carbon black; foreign production was negligible. In 1939, U. S. exports amounted to 38.7% of domestic production. Unless plants are built abroad, the United States will have to continue to supply foreign demands. Based upon the larger amount of natural rubber used abroad, and the more economical foreign use of carbon black, it seems probable that annual post-war foreign demands will be about 500 million pounds. This means that a total market

for domestic and foreign carbon black of between 1.2 to 1.4 billion pounds annually is indicated at least for some years. This market should facilitate disposal of the government-owned plants, but it is not the controlling factor.

Carbon black is made chiefly from natural gas, and several states have conservation laws permitting only sour grades of gas (high in sulfur) to be used for this purpose. It is usually more profitable to sell the gas for fuel, provided pipeline facilities for transporting it away from the fields are available, than to carbon black producers. Hence, while the carbon black industry is the largest consumer of natural gas next to its use for fuel, this outlet, always near the source of gas supply, exists only in the absence of adequate gas pipeline facilities; where such facilities are provided, carbon black manufacture is usually discontinued. This condition results in the carbon black industry being a migratory one, confined mainly to the early life of gas fields, and to those fields where pipeline outlets for fuel gas are inadequate. As gas prices increase to fuel market levels, the carbon black plants have to move to new localities. In this respect oil fields supplies are even less secure than natural gas fields.

The Odessa, Tex., carbon black plant is located in what is primarily an oil field area. Unless a purchaser or lessee of the plant can secure a supply of gas on a long-run contract basis at a competitive price, and unless gas continues to be available in the area, the plant may not be able to operate for a long period, the WAA points out. In its favor, however, is the fact that the Odessa plant is in general of newer and more efficient design, with features that should result in lower operating costs. Similar general considerations like those outlined above will affect the disposal terms for the five smaller government plants, it was added.

Under the Odessa plant lease, the lessee granted to Office of Defense Plants and to any purchaser or subsequent lessee a non-exclusive royalty-free license to use and operate the plant for manufacturing carbon black under all inventions, patented or not patented, acquired by lessee prior to termination of lease or expiration of the option. There are other separate license agreements relating to the same plant. Several firms granted licenses to ODP for use in the plant and gave to operator non-exclusive licenses and technical information on pelletizing through November 29, 1949, as well as on gas purification and desulfurization. It is incumbent on the disposal agency to assist a purchaser or lessee in obtaining reasonable terms under any patents needed for operation and not covered by the terms of the lease.

The Odessa plant lease provides a purchase option to the present lessee for a period of 90 days after termination, which requires 10 days' notice. The option gives the lessee the right to purchase the plant on two bases, whichever represents the larger return to the government: (1) original cost less 10% per year depreciation or (2) original cost plus 4% per year, less rental paid plus 4% per year interest. The lessee had a right of first refusal, which expired March 31, 1946. Notice of termination under the operating agreement has already been given.

Styrene

Prior to the war the only commercial producer of styrene was Dow Chemical Co. whose privately owned plant at Midland, Mich., was subsequently expanded to a present capacity of approximately 36 million pounds a year. To meet the needs of the expanded GR-S rubber program, and to keep pace with the increased butadiene schedule, it was necessary for the government to build five styrene plants.

Two government-owned plants using the Dow process were built at Los Angeles, Calif., and Velasco, Tex. To provide a greater degree of operating protection by obtaining diversification in processes, a third plant, using the process of Carbide & Carbon Chemicals Corp., was constructed at Institute, W. Va., adjacent to government-owned butadiene and copolymer plants. A fourth styrene plant employing a process developed by Monsanto Chemical Co. and others was erected at Texas City, Tex. The fifth plant, built in conjunction with butadiene facilities at Kobuta, Pa., involved in part a process developed by Dow and in part a process developed by the Koppers Co. These companies exchanged necessary patent licenses and technical operating information.

The government, in terms of the total design capacity of styrene plants, owns 91.3% of the national capacity, representing a total investment of $77,277,000. Actually the percentage is higher, because on the average the plants have demonstrated a capacity to produce at rates as high as 50% above design capacity when necessary.

The principal raw materials for making styrene are ethylene and benzene. Since at the beginning of the program ethylene was available only in limited quantities, units for its production from industrial alcohol were installed at the Los Angeles and Kobuta plants. These two plants were later equipped with facilities for utilizing by-produce ethylene contained in fuel gases available in their respective areas so that the government no longer uses alcohol for the production of styrene. The Texas City plant obtains its ethylene from propane extracted from natural gas. The ethylene for the Velasco and Institute plants is supplied through pipelines from nearby sources. The benzene for most plants is shipped in by barge or tank car.

The cost of producing styrene is primarily a function of raw material costs, operating expenses are moderate. The GR-S program now provides a large demand for styrene, and future demand for its use in synthetic rubber promises to be substantial. On the basis of 300 pounds of styrene per long ton of GR-S, the production of 600,000 long tons of GR-S in 1946 will consume 300,000,000 pounds of styrene; 450,000 tons will take 225,000,000 pounds of styrene; and even at a 300,000-ton GR-S production level, 150,000,000 pounds of styrene would be required annually for rubber alone.

Since the styrene requirements for GR-S will remain large for a considerable period, consideration must be given, in connection with the sale or lease of styrene plants, to the necessity of providing for continuing supplies of styrene to meet the needs of the GR-S program. In addition, and so long as the government continues to own and operate the GR-S plants, such styrene as is required by the government should be made available at no advance in cost to the government. Such arrangements can presumably be consummated in such a manner as to permit the operators to sell excess styrene in the general market.

The demand for styrene for synthetic resins and dyes is at present in excess of the privately owned facilities: namely, 36,000,000 pounds per year, and is increasing. Styrene from the government-owned plants has only been made available for private (non-rubber) uses for the past few months. Experience of sales during this period confirms the widely held belief that most, if not all, of the present capacity can be profitably maintained in production, the report states.

The "Agreement on Exchange and Use of Technical Information Relating to Styrene" was made on March 4, 1942, between the Office of Rubber Reserve and nine oil and chemical companies which possessed patent rights, technical knowledge and/or experience in the styrene field. The agreements covers both the manufacture of styrene from ethylbenzene and the manufacture of the latter from ethylene and benzene. No direct licenses to Rubber Reserve are provided; the purpose is to effect interchange of technical information. No licenses are exchanged, but each party is permitted to improve its own process through the patents and technical information of other parties, subject to claims for such use, under stipulated royalties. The claim procedure of the agreement stipulates that the total royalty of any operator to the other parties to the agreement shall not presently exceed ⅛¢ a pound of styrene produced for the government. Each operator is paid by Rubber Reserve an amount to cover royalties of ⅛¢ a pound of styrene produced.

The Styrene agreement provides that the owners of patents and technical information used in a given government-owned styrene plant shall grant to any subsequent purchaser or lessee a license upon reasonable terms and conditions approved by Rubber Reserve, and at total royalty rates not to exceed ⅛¢ a pound of styrene manufactured for Rubber Reserve during the term of the Agreement, 2½% of the cost or sales price of styrene purchased by Rubber Reserve thereafter, and 5% of the sales price of styrene produced for other purposes.

In addition to its own facilities, which have an annual capacity of 36,000,000 pounds, Dow Chemical operates two government-owned plants having a design capacity of 150,000,000 pounds a year, or about 40% of the capacity of the five government plants. Dow possesses a relatively strong patent position in the styrene field. Three of the government plants employ Dow process, and the others have adopted modifications which may be subject to Dow patents. However it is anticipated that plants can be disposed of to other operators in such a manner as to raise no serious questions under the anti-trust laws, the WAA states.

Summary of Disposal Program

According to this report the War Assets Administration proposes to put into effect the following disposal program:

1. The Butyl, neoprene, styrene, furfural, and carbon black plants will be offered for disposal forthwith, and their availability given wide publicity.

2. Preliminary negotiations will be carried on with potential purchasers or lessees, and, when sufficient interest has developed to warrant disposal action on any category of plants, a cut-off date for bids will be set for that category.

3. An effort will be made to effect disposal by sale, but leases will be considered where sale on acceptable terms is not possible or where leases promise more fully to promote the objectives of the Surplus Property Act.

4. Disposal action will, where necessary, be subject to conditions prescribed by the owning agency to assure that the requirements for synthetic rubber continue to be met as long as natural rubber remains in short supply.

5. In the course of preliminary negotiations in the case of Butyl, neoprene, and furfural plants, special attention will be given to the possibility of disposal to other than the present operators to avoid establishing the latter as sole producers. It may, however, develop that in particular cases the present operators will present the most favorable bids. In such cases disposal to these operators is not foreclosed, subject, of course, to review by the Department of Justice as provided in the Surplus Property Act.

6. The Office of Rubber Reserve will be requested (a) to advise prospective purchasers or lessees as fully as possible concerning the patent rights that are available to them as a result of the commitments of the parties to the exchange agreements to grant licenses to private operators of the plants, and (b) in any other possible ways to facilitate the acquisition of the necessary patent licenses by new operators.

Inter-Agency Committee Report on GR-S Plants

William L. Batt, chairman of the Inter-Agency Policy Committee on Rubber, forwarded to Director John W. Snyder of the Office of War Mobilization and Reconversion, his interim report, dated June 13, 1946, on the disposal of the government's butadiene and copolymer plants. In his letter of transmittal Mr. Batt called attention to the fact that because of the delay in the disposal of synthetic rubber plants that would be occasioned should Congress adjourn less than 30 days after a disposal plan has been submitted, he hoped the report would be forwarded to the President and Congress on June 17.

Mr. Snyder apparently forwarded the interim report to both the President and Congress on June 17.

Reason for Interim Report

Mr. Batt, after making mention of the First Report of the Inter-Agency Committee, stated that contrary to the expressed intention of issuing, at a later date, a supplemental report recommending in detail: (a) administrative method for minimum use of general-purpose synthetic rubber, (b) research and development programs, (c) further plans for plant disposal, and (d) the recommended structure for national rubber supervision, a situation has now arisen, involving the time element, which makes impracticable the treatment of all these subjects in a single report. Under the Surplus Property Act a plan for the disposal of synthetic rubber plants must be before Congress for 30 days, while it is in session, prior to consummation of any sale. The War Assets Administration is prepared to submit such a plan with regard to the butadiene and copolymer plants within the limits of policy set by the Inter-Agency Policy Committee on Rubber, of which it is a part. Unless such a policy is established promptly, it will in all probability be legally impossible to dispose of any of the Government-owned butadiene or copolymer plants costing more than $5,000,000 until Congress convenes early in 1947. Under these circumstances all of the butadiene and copolymer plants would be frozen in the hands of the government for the next eight months. The Committee does not look with favor upon such a condition, feeling that much may be accomplished toward private ownership of parts of the system in the months immediately ahead, the report states. Hence this interim report dealing with disposal of the butadiene and copolymer plants in the GR-S program is issued now and is to be followed at an early date by a final report completing the Committee's recommendation.

Statement of the Problem

The recommendations embodied in the First Report of this Committee were predicated on the assumption that, because of possible cost and quality relations between GR-S and natural rubber, a free market might not for some time express a voluntary preference for general-purpose synthetic rubber in a quantity adequate to satisfy the national interest in the maintenance of a domestic synthetic rubber industry.

The butadiene and copolymer plant disposal problem is complicated by the necessity of insuring that the transfer from government to private ownership takes place without curtailing adequate output by the industry during the short-run period in which natural rubber is in short supply. At present the industry is thoroughly integrated, and all of the plants in the system are centrally administered. The Office of Rubber Reserve of the Reconstruction Finance Corp. distributes the output of the government-owned styrene and butadiene plants to the government-owned copolymer plants so that the former always have an assured market for their products, and the latter an assured supply of materials. In distributing GR-S output to the manufacturers of rubber products, the government also provides a market for the output of the copolymer plants.

The copolymer and butadiene plants transferred to private owners must be subject to such governmental production planning and allocation procedures as are continued while natural rubber is in critical supply.

"Basic" and "Fringe" Plants

There are 15 copolymer plants and 10 large petroleum butadiene plants in the United States which are currently in operation. In addition wartime operations included four smaller butadiene plants, only one of which is presently operating. The four were scrambled with privately owned refinery equipment. The government equipment contained in one of these has already been sold; while the government equipment in the others is presently in process of disposal.

The copolymer and petroleum butadiene plants may be divided broadly into what may be called "fringe" plants and "basic" plants. The fringe plants are those which in all likelihood, will not be required at all for synthetic rubber production or stand-by capacity under the proposed national security program. They fall into this group either because of high production cost, location dictated by wartime needs and now economically unfavorable, or both. Although some of them are currently in operation, when the prospective decline in synthetic rubber requirements materializes, it is virtually certain that the adjustment to lower production levels will be made, not by continuing to operate all of the plants at diminishing rates of production, but by closing down the "fringe" plants one by one..

The "basic" plants are those most likely to be needed either in production or stand-by for the long-run synthetic rubber program, because of low cost and favorable location and because they utilize different feedstocks and embody diversified engineering principles which it is desirable to maintain in the interest of a well-balanced program.

The petroleum butadiene plants fall currently into two cost groups. Those in the lower cost bracket, considered as "basic" plants, do not differ too greatly from one another in production costs. Those in the higher bracket, the "fringe" plants, vary substantially in production cost, but are all sufficiently high cost to indicate the probability that none will displace any of the plants in the present low-cost group. The possibility must be recognized, however, that technological and operational improvements are capable of modifying the present pattern.

The copolymer plants exhibit no similar sharp division into low-cost and high-cost producers. Most plants were built under a standard pattern developed under government direction. As compared with the petroleum butadiene plants, cost differentials among the entire list of plants are relatively small. The major considerations, therefore, in determining which plants should be classified as basic and which as fringe revolve about the geographical location of the plants. It is apparent that plants adjacent to the lowest-cost butadiene plants possess certain advantages, but these advantages may be balanced or outweighed in the minds of prospective purchasers by such factors as the relative locations of the synthetic plants and existing rubber fabricating facilities, future expansion plans of the purchasers, etc.

The Committee believes that discussions should be initiated immediately between WAA, the Office of Rubber Reserve of the Reconstruction Finance Corporation, and representatives of private industry interested in the acquisition of the copolymer and butadiene plants. By reviewing the operating experience of the government plants, together with the manufacturing plans of prospective purchasers, these discussions will contribute materially to the determination of which plants should be considered "basic" and which should be considered "fringe."

Disposal of Basic Plants

In disposing of the basic copolymer and petroleum butadiene plants, the government cannot disregard their future long-term use as it may in the case of those plants in the program which disposal discussions indicate are in the "fringe" category. Since the country's long-term synthetic rubber program is dependent upon the basic plants, the government must be assured that its disposal action will satisfy the requirements of national security and will not jeopardize the continuous and adequate supply of synthetic rubber.

The government must be assured that those who acquire the basic plants are qualified to operate them. However in order that ownership of the industry does not become concentrated in too few hands, all interested and qualified private

parties should have an equal opportunity to secure a place in the structure of the industry. In disposing of the plants the government should endeavor to achieve wide distribution of ownership in order to insure effective competition.

The committee believes that disposal negotiations should proceed forthwith, subject to the above considerations and in accordance with the following plan. When, as a result of discussions with prospective private operators, it appears likely that bids will be submitted on a sufficient number of plants to constitute the nucleus of a strong diversified private industry, the government should invite the simultaneous tender of bids, if possible not later than the end of 1946, reserving the right to reject them in whole or in part.

The committee estimates that the annual capacity of the plants in the "basic" category will be approximately 450,000 long tons of GR-S. The bidding process proposed above would permit the selection of particular plants to be retained in the long-run program to be arrived at by the free chioce of bidders from among the whole list of basic butadiene and copolymer plants. Bidders should be advised that disposal will involve the following reservations:

(1) That the plants must be operated for the production of synthetic rubber during the short-run period of inadequate rubber supply, subject to existing government controls in the light of the continuing rubber emergency;

(2) That the plants must not, without the consent of the government be so altered after the short-run period that they are not reconvertible in a reasonable period for the production of synthetic rubber;

(3) That the government will have the right to reacquire the plant if the two foregoing conditions are not met.

The bidding on this basis must indicate that private industry will acquire a nucleus of plant capacity adequate to protect the longterm objectives—at present considered to be the production of at least 250,000 long tons—before the government should accept the bids proffered. It is, of course, recognized that during the short-run period the government must retain in production whatever capacity is necessary to satisfy national needs.

Basic plants not acquired by private interests should be retained by the government, which should commit itself not to operate such capacity in competition with private industry except in the existing rubber shortage or in any future national emergency. The Committee sees no reason why any portion of this capacity should not be continuously available for disposal on the terms above indicated.

Disposal of the low-cost plants to private industry during the period in which high-cost rubber must be produced to meet national requirements may entail operations by the plants remaining in government hands at a substantial loss. At present, with the government operating all of the plants, the selling price of GR-S permits production of the high-cost rubber without necessitating outlay of funds from the public treasury. In the event that high-cost plants must be operated by the government after low-cost facilities are in private hands, any losses sustained will require the authorization of Congress.

Disposal of "Fringe" Plants

In connection with this classification the Batt report states that as soon as a determinaion has been made that a particular copolymer or butadiene plant is "fringe," it should promptly be offered for disposal. In all probability determination of certain of the fringe plants can be made promptly. In some instances, however, it may not be possible to place a plant definitely in the fringe category until the pattern of disposal of the basic plants has been established. The sole condition that should be attached to their disposal is that they may be called upon to produce synthetic rubber during the short-run period of inadequate rubber supply, the report adds.

Disposal of Alcohol Butadiene Plants

It is next pointed out that although the disposal of the alcohol butadiene plants constitute a part of the program outlined above, these plants are affected by certain special considerations which make it desirable to single them out for separate treatment.

After reviewing the location and operation of the three alcohol butadiene plants and mentioning that they were placed in stand-by condition late in 1945, the report goes on to mention the operation of the Institute, W. Va., plant for a limited period to increase the GR-S supply during the current period of record rubber use and the fact that the alcohol shortage prevents the operation of the other two plants.

Because of the high cost of alcohol it will in all probability remain much cheaper to produce butadiene from petroleum than from alcohol, and the Committee therefore believes that all of the alcohol butadiene plants can immediately be offered for disposal, with the reservation that one of the plants should be disposed of subject to the condition that it be maintained in stand-by condition for the production of butadiene even after natural rubber is in ample supply. The retention of an alcohol butadiene plant in stand-by condition implies the desirability of also retaining in stand-by condition a nearby copolymer plant which, in time of emergency, could be used in conjunction with the butadiene plant. The selection of the butadiene and copolymer plants to be thus retained in stand-by should primarily depend on which of the alcohol butadiene plants private industry proves most desirous of acquiring for other purposes.

Terms of Disposal

In concluding the interim report the Batt Inter-Agency Committee makes the following comment on disposal terms:

"The Committee believes sale of the plants offered for disposal to be preferable to leasing arrangements. Ownership would afford a sound impetus to desirable expenditures for physical improvements and the development of new manufacturing techniques. However, in the event that satisfactory terms of sale cannot be agreed upon which will protect the government's financial interest in the plants and its continuing interest in those basic plants essential for national security, leases should be considered.

"The requirements of national security and interest must take precedence over dollars and cents considerations. In view of the large area of uncertainty in the eventual quality and price relationships between synthetic and natural rubber, the private purchaser of a plant should be enabled, during the initial period of his ownership, to turn the plant back to the government without undue loss. Although a substantial initial payment should be required in the case of sales in order that the purchaser have a stake in the enterprise, the balance of the payments might well be spread over a five- to ten-year period. The government should have recourse only against the plant in the event of default in the payment of any installment.

"Since there has been rapid technological progress in the synthetic rubber field, certain parts of the existing facilities may become obsolenscent. This factor will have to be given consideration in fixing the terms of sale.

"In the event of any default resulting in a plant reverting to the government, the operator should be required, subject to reasonable compensation, to make available to the government the benefits of inventions made or technical information developed during his ownership or lease essential to the operation of the defaulted plant."

Plant Disposal Presents Many Problems

Disposal of the government-owned synthetic rubber and component plants, as outlined in the WAA and Batt Committee reports, presents many problems such as monopoly considerations, cross-licensing of patents, royalty payments, etc., which may prevent very prompt action, particularly since none of the plants costing $5,000,000 or more can be disposed of without approval of Congress. It is understood that two farm bloc senators, George of Georgia and Fullbright of Arkansas, already have introduced a resolution restraining disposal of six alcohol and alcohol-butadiene plants.

A large part of the rubber industry has already expressed the opinion that in view of the uncertainty surrounding the price of natural rubber during the next two or three years, it would prefer the government to continue to own and operate the synthetic rubber plants during that time.

Miscellaneous Disposals

The WAA, on May 28, announced that the sale had been approved for the incomplete rubber plant at Chelsea, Mass., to the Panther-Panco Rubber Co., Inc., for $800,000. This plant was sponsored by the Office of the Rubber Director, but was only 90% complete. The purchase price was the result of negotiations between WAA and Panther-Panco, which manufactures rubber soles, strips, blocks and heels.

Buildings, machinery, and equipment in Louisville, Ky., operated by the B. F. Goodrich Chemical Co. for the manufacture of synthetic rubber, were offered for sale or lease by the WAA on May 31. This plant was designed to produce either 60,000 tons of GR-S or 37,500 tons of GR-S and 12,500 tons of GR-A (Buna N) per year. A "cut-off" date for bids was announced on June 4 for 4:00 p.m. on June 10.

A five-year lease of the plant formerly operated by the Continental Motors Corp. at Garland, Tex., was authorized on June 12 at an annual rental of $124,800 to the Sieberling Rubber Co., which was also offered on option to buy the plant at the end of the five-year period. It was stated that Sieberling Company will convert the plant to the production of commercial-grade automotive tires.

Pharis Tire & Rubber Co., Newark, O., has entered into an agreement with the RFC to purchase the building located on the

company's property, which was originally constructed by the Defense Plant Corp. as part of the December, 1944, military truck tire program, it was announced on June 13 by Furber Marshall, president of the Pharis company. The two-story building, which contains 124,000 square feet of floor space, will be used mainly for warehousing, but will also be used to house a new laboratory; additional offices and training activities will be accommodated in the new building.

Industrial Relations News

A new threat to peaceful management-labor relations in the rubber industry developed during June by virtue of a new wave of wage and working conditions demands which are now being drafted by the local U.R.W.A. unions, under the guidance of the international union. In addition the U.R.W.A. through its general counsel, G. I. Patterson, submitted a request early in June to the National Wage Stabilization Board to reconsider the Big Four wage agreement of last March so as to make it an industry-wide pattern. Meanwhile a number of work-stoppages at various plants continued to plague the industry. P. W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Co., in a talk in Boston on June 8 decried monopolies in control of labor and said that past abuses on the part of wealth have been exceeded today by those of organized labor. Plants of the General Tire & Rubber Co. at Waco, Tex., Jeannette, Pa., and Akron, O., were closed down by walk-outs during the latter part of June in disputes over wage rates and working conditions.

Wage and Working Condition Demands

The international U.R.W.A. (CIO) early in June through a request submitted by its general counsel, G. I. Patterson, asked the National Wage Stabilization Board to reconsider the union's application to make the Big Four wage agreement an industry-wide pattern. The Board last March denied such a request, and as a result each local union at the various companies not covered by the Big Four agreement has had to go through a long and tedious process of getting separate approval for each agreement.

It was reported that in a letter to the Board Mr. Patterson stated;

"The union has a responsibility of seeing that plants outside the Big Four meet the increase granted by the Big Four. If those plants refuse because there is no pattern established by the Board, and many of them are refusing, the union will have no alternative except to enforce its demand for similar increases through strikes."

During the month local unions at plants of the Goodrich, Firestone, and U. S. Rubber were reported to have passed resolutions asking the international union to reopen Big Four negotiations in connection with the master contracts now being drawn up with the companies by the international union; these new resolutions lead toward further wage increases based on that part of the original Big Four agreement that stated:

"During the one-year agreement, general wage scales shall be subject to negotiations if conditions economically and in the industry warrant, but only on a four-company basis."

Since local unions of the Goodyear company had not late in June taken similar action, no great significance was attached to this action by the local unions of the three other companies, but it was considered as an indication of support of the national CIO stand against elimination of the OPA and an opening gun for further wage increases when and if the union thought it could, along with CIO unions in other basic industries, have a good chance of getting such increases. With the rubber industry leading the reconversion parade and the prospect of continued high earnings by the workers, it is understood that the rank and file of organized labor is much less enthusiastic than it was a few months ago about exhorbitant wage or working condition demands by its leaders, since they might precipitate a long and costly strike.

However some of the demands being made by the local unions are really fantastic and could only lead to more strikes since management could not accept them and stay in business. The local unions have asked or will ask for paid vacations of one week for one-year employes, two weeks for two-year employes, and three weeks for five-year and over employes. They will ask for a substantial Christmas bonus for all employes. The company will be responsible for health and accidents, and all relief and insurance dues are to be paid by the company. All wage rates are to be brought up in each individual plant (company-wise) to the highest wages paid in any plant. The company is to pay for all negotiation time at meetings. Each employe is to have 15 minutes wash-up time, 20 minutes when a clothing change is necessary, and 30 minutes on real dirty jobs such as carbon black handling, etc. These are a sample of the demands of which there are many others.

The Litchfield Talk

Mr. Litchfield, in a talk delivered at the annual alumni dinner of Massachusetts Institute of Technology at the Hotel Statler in Boston on June 8, called attention to the fact that in the United States reconversion to peacetime production is interrupted by nation-wide strikes and class bitterness.

"It has been possible for the earth to provide a progressively improved standard of living to a constantly increasing population when the tools of production have been efficiently used by labor and when all available knowledge of better processes and methods have had opportunity for practical application. Anything that stops this cooperation, causing idle or inefficient labor, or idle or inefficient use of capital, stalls progress and encourages selfishness and greed. Instead of producing more wealth for everyone to share, men start to fight for a bigger share of what has already been produced, and civilization goes backward," Mr. Litchfield said.

"In these days of mass production in industry, only through cooperation rather than by antagonism between those who furnish labor and those who furnish the tools of industry, can the present standard of living be maintained or improved. . . . Whenever there is a monopoly in the control of capital, or a monopoly in the control of labor, individual freedom is threatened.

"The growth of mass production in modern times resulted in the concentration of wealth in the hands of a relatively small number of people, and an approach toward monopoly. This was followed by many abuses of the power of wealth, tending to reduce the freedom and bargaining power of the individual. This necessarily resulted in a series of laws to curb the power of capital and to prevent its use for selfish purposes rather than for service to the many.

"The power of capital has now been so restrained through legislation and taxation as to almost destroy the incentive to risk putting it to constructive use. The result has been that the government has had to supply the capital instead of it coming from private interests.

"In these more recent times laws aimed to restore the bargaining power of the individual have gone to the opposite extreme, resulting in monopolistic practices in the control of labor, especially since the close of the recent war. This has gone so far as to paralyze production and transportation and has resulted in the government taking control of the tools of industry and transportation, thus concentrating control of all wealth in the hands of the government.

"Many laws passed to strengthen the bargaining power of labor have failed to provide the proper safeguards to make labor responsible for its actions. In recent years this has been true to such an extent that the control of labor has now been concentrated in fewer hands than ever was the case in the control of capital. With increased power, monopolistic practices grew up in the control of labor which have resulted in abuses similar to those formerly practiced by capital. The old, selfish 'the public be damned' attitude, originally espoused by a misguided capitalist, has recently been applied by labor leaders and with wide and distressing effect. This is a natural result when one class tries to gain a selfish advantage at the expense of the people as a whole. The processes of bargaining have been distorted to such an extent as to require government to take over the control of capital to carry on the bargaining in order to protect the public. This results in the government having almost complete control of capital.

"The end result of a continuation of this trend would be an all-powerful state with the individual subject to the whim and planning of a dictator. Should this happen, the individual bargaining power of both capital and labor would be completely destroyed. . . .

"The longer abuses of power are tolerated, the more difficult it is to apply corrective measures. Appeasement and temporary expediency measures will not prove successful in solving the international problems of clashing ideologies, nor will it correct the condition within our country where people are divided into classes and engaged in industrial strife. The causes must be removed by curbing the forces of selfishness whether applied by a nation or by an economic group within a nation.

"Whenever justice and right are challenged by the selfish powers of might,

appeasement has to give way to a fight for principles—and this is the price we must be able and willing to pay—if we are to transform our *desire* for peace and freedom into *demand*," Mr. Litchfield said in conclusion.

Miscellaneous Work-Stoppages, Etc.

Banbury workers at the Goodyear tire plant in Akron walked out on May 29 in protest over new wage rates for their jobs and, as a result, four of the workers were suspended for one week by the company. Five hundred mill-room workers joined the walkout, and the shortage of milled stock stopped work in other departments and made about 8,000 idle by June 1. Meetings between company officials and local union No. 2, U.R.W.A., where held, and C. V. Wheeler, president of the local union, advised the men to return to their jobs until the grievance had been argued with the company, but he reported that the men refused to go back to work until they had "received satisfaction." At the end of the week's suspension period for the four Banbury workers, all of the Banbury and mill-room workers returned to their jobs on June 5. Company officials estimated on June 5 that it would take at least two more days before enough milled stock could be produced to renew normal tire production.

A request by the General Tire & Rubber Co. at Akron to continue the present contract with local No 9, U.R.W.A., was rejected by the local union at a meeting on June 9. It was reported that the local union members requested their officers to: (1) seek an increase above the 18½c-an-hour approved in the Big Four agreement to offset the rise in living costs, (2) demand the immediate retroactive pay of 18½c-an-hour to Banbury and mill maintenance employes, (3) continue the present contract on a day-to-day basis, (4) not sign a new contract unless the company reaches agreements with the Waco, Tex., and Jeanette, Pa., General locals, and (5) to use the recent 1,261 for to 128 against strike vote as "the executive board desires." During the week beginning June 17, local unions at the Waco, Jeanette, and Akron plants of General Tire walked out within a period of 24 hours of each other because of various local grievances.

Workers in the compound room of the Firestone Tire & Rubber Co.'s Plant 1 in Akron walked off their jobs on June 17, protesting that the company had cut their wages 13c an hour. According to a report attributed to I. H. Watson, president of local union No. 7, U.R.W.A., about 125 men were involved, but 6,000 could be affected if the dispute was not settled. Mr. Watson said the action by the workers was taken regardless of any advice from union officials.

The Armstrong Rubber Co., West Haven, Conn., announced on June 2 that a new contract had been negotiated with local union No. 93 of the U.R.W.A., which provides for a general wage increase of 18½c an hour, retroactive to March 4, of which 12c an hour is retroactive to December 17, 1945. All Armstrong factory production employes on the payroll at the time the contract is formally signed and approval of the National Wage Stabilization Board is received will be entitled to the retroactive pay, it was said. The contract also provides for double-time for Sundays and holidays and time and one-half for the sixth day worked in any week. Armstrong also announced that it has applied to the Wage Board for approval to grant office workers, not represented in these negotiations, an increase of 15%, retroactive to January 1, 1946.

Tire Prices Raised; Other OPA Revisions

An overall increase of 4½% has been granted in manufacturers' maximum prices for tires sold to vehicle makers to put on new automobiles, trucks, and other motor vehicles, according to Amendment 6 to RMPR 119—Original Equipment Tires and Tubes—effective June 11. This action will mean an added return to tire manufacturers of approximately $20,000,000 a year, based on forecast volume for the next year.

No change is made at this time in the ceilings of automobiles and other vehicles because of this added cost, OPA said.

Explaining why this increase had to be given, OPA said that the tire industry had experienced higher costs for labor and materials since the beginning of 1946 that necessitated an upward revision in original equipment tire ceilings so that manufacturers would be able to break even on these operations. Without the increases the industry would sustain a substantial net operating loss that would threaten continued necessary production of these tires. The new ceilings allow average total costs for the industry.

Original equipment sales of tire manufacturers vary all the way from a negligible amount to 25% of total sales, depending on the company. Most tires sold are for replacement purposes after the vehicles are put on the road.

Breaking down the overall increase of 4½%, OPA said that on passenger-car assemblies, comprising tire and tube, which account for 35% of total original equipment tire sales, the increase averages 7%. Ceilings are similarly increased on industrial tires, accounting for less than 5% of total volume. Truck tire assemblies, which represent about 50% of total production of original equipment tires, have ceiling price increases averaging 3.7% on small sizes, with no increase on the large sizes. There are no increases on farm implement and tractor assemblies.

Later in the month OPA announced that maximum prices for passenger-car and motorcycle replacement tires have been increased at manufacturing, wholesale, and retail levels by amounts equal to 3.3% of the existing retail ceiling prices, and that manufacturers' and wholesalers' ceilings for truck, bus and industrial replacement tires have been increased by the equivalent of 1.4% of the existing retail ceilings. No change is made in retail ceilings for these tires. (Amendment 11, RMPR 143—Wholesale Prices for New Rubber Tires and Tubes; and Amendment 7, RMPR 528 — Tires, Tubes, Recapping and Repairing, and Certain Repair Materials—both effective June 18.)

The increases have also been necessitated by higher manufacturing costs for labor and materials.

OPA pointed out that the increases in passenger-car and motorcycle replacement tires at the retail level have been allowed on an interim basis. Such retail increases will be revoked if evidence has not been submitted to OPA by October 1, 1946, showing that dealers cannot absorb the price increases granted manufacturers and wholesalers on these tires and that they must be allowed to continue passing them on to consumers.

OPA said that on the basis of studies made in 1941 and 1944, brought up to date by making allowances for increases in expenses and volume of sales since those years, absorption of approximately two-thirds of the manufacturers' price increases could be required of dealers without causing hardship. The manufacturers' advisory committee and members of the distributers' advisory committee, however, have challenged the adequacy of some of the data supporting such absorption, especially as to the change in the number of distributer outlets and the spreading of the 1946 sales volume among them.

OPA is willing to examine evidence that distributers wish to submit on these matters, and has been assured of full cooperation by both committees in making this examination. In view, however, of the delay involved in this examination and the urgency of the need of price relief for manufacturers, retail dealers are allowed to pass on the increases temporarily.

No changes were made in the ceilings of farm tractor tires at any level of sale.

Based on this year's expected output, replacement tires represent approximately two-thirds of the industry's total tire production, with one-third going to original equipment manufacturers to put on new cars and trucks.

The higher ceilings authorized will mean an added return to tire manufacturers of approximately $18,500,000 a year, based on this year's expected volume.

The new retail ceiling price for the popular-size 6.00-16 four-ply passenger-car tire, which represents 70% of all passenger-car tire sales, is $15.70, nationwide, an increase of 50¢ over the previous ceiling. During the war the retail ceiling for this tire rose to $17.11, but was reduced to $16.05 in May, 1944, with another reduction to $15.20 in April, 1945.

The new retail ceilings for other passenger-car tires will range from $8.30 for the smallest tire to $27.40 for the largest in four-ply construction, the main type. The six-ply construction tires will have retail ceilings ranging from $14.35 to $39.65 each. New retail ceilings for motorcycle tires range from $8.60 to $12.70.

OPA pointed out that truck, bus, and industrial tires have been generally sold by retail dealers at a discount off the existing ceilings. Thus dealers can move up to the existing ceilings on these tires if they wish. In the case of the few dealers who have been selling at the full ceilings, their margins are sufficient to enable them to pay the higher prices established at manufacturing and wholesale levels.

The new amendments were adopted after extensive discussions with the industry advisory committees for both manufacturers and distributers and after studies of the industry's most recent earnings and cost increases, which showed that out of 17 manufacturers, accounting for between 90 and 95% of the industry's total production, nine companies,

mostly small manufacturers, could not absorb their higher costs for labor and material without financial loss to them and without a threat to their continued operation.

Thus, to maintain essential supplies of tires, and give an operating return to the bulk of the industry, including small firms, the price increases were found required. They are consistent with the stabilization program and in line with Executive Orders of the President for an effective transition to a peacetime economy, OPA explained.

Order 37 to RMPR 143—Wholesale Prices for New Rubber Tires and Tubes—gives the maximum price for a new 12.00-28 six-ply, low-pressure Ground Grip Road Builder tire made by **The Firestone Tire & Rubber Co.**

The following recent orders added to RMPR 528 give the retail ceiling prices for the new products indicated: No. 113, four sizes of Silent Grip industrial tires manufactured by The General Tire & Rubber Co., Akron, O.; No. 114, 16 sizes of synthetic rubber stop-start tires, Firestone Tire & Rubber Co., Akron; No. 115, eight off-the-road logger tires, Lee Tire & Rubber Co. of New York, Inc., Conshohocken, Pa.; No. 116, one industrial pneumatic and one small and garden tractor ANS tread tire and tube, Firestone; No. 117, an aircraft tire and tube, Firestone; No. 118, one mud and snow truck tire, Lee; No. 119, a semi-solid lawn mower type of tire, Goodyear Tire & Rubber Co., Akron; No. 120, a 7.50-20 Rock Grip excavator-type tire, Firestone; No. 121, bullet-proof-type tube, K & W Tire & Parts Co., Sioux City, Iowa; No. 122, Indianapolis and dirt-track racing equipment tires, Firestone; No. 124, Life Guard tube, tractor tire, trailer tire, Goodyear.

Order 33, RMPR 131, sets ceilings for tractor tire reliners made from scrap tires by A. Lakin & Sons, Inc., Chicago, Ill.

Changes in Other Orders

Manufacturers' and wholesalers' ceilings for sales of rubber heels and soles in the shoe factory and home replacement trades were upped 10½% by Amendment 18 to MPR 477—Sales of Rubber Heels and Soles in the Shoe Factory and Home Replacement Trades—effective June 4. The increase was granted to maintain manufacturers' base period return on current net worth by compensating for most of recent increases in wages and material costs. Manufacturers are absorbing part of such increased costs.

No change is made in consumer prices for rubber heels and soles, OPA stated.

The bulk of these rubber heels and soles are sold to shoe factories for use on new shoes. Amendment 18 will result in increased costs to shoe factories of less than 1¢ a pair on heels and less than 3¢ a pair on soles.

The small percentage of heels and soles disposed of in the home replacement trade is sold to consumers by chain and hardware stores, which will absorb the increased price alllowed. OPA said that these retail stores are generally realizing a higher margin in dollars and cents on sales of rubber heels and soles than they realized during the base period and thus are able to absorb the increase at the manufacturing and wholesale levels.

Order 57 under 3 (e), Amendment 3, GMPR, establishes maximum prices for sales in the shoe repair trade by the manufacturer thereof and by wholesalers of certain heel and sole items bearing the brand name Neolite, manufactured by the Goodyear Tire & Rubber Co., Akron, O. The order also sets ceilings for shoe repairmen's sales of unattached Neolite sole items and for Neolite heel and toplift items.

Amendment 1 to RO 91, SO 94, adds to the coverage of the order men's 18-inch ankle fitting rubber boots, five-eyelet type—standard rubber sole and heel.

Order 20, MPR 200, establishes maximum prices for men's golf spike brown rubber full soles and men's ⅝-inch bevel golf spike brown rubber heels, manufactured by Avon Sole Co., Avon, Mass.

Region I Order G-1 under S. S. Reg. 47 to RMPR 165 deals with retail shoe repair services in Massachusetts, Rhode Island, and Connecticut, including prices for work on rubber half-soles, Neolite brand manufactured by the Goodyear Tire & Rubber Co., and Panelene brand of Panther Panco Rubber Co. Region III Order G-3 and Region III Order G-4 cover similar service charges for Detroit, Mich., and for Ohio, Kentucky, Indiana, and Michigan, respectively.

Several orders were issued last month to MPR 478 authorizing maximum prices for pyroxylin and vinyl coated fabrics: No. 172, Walton Cotton Mills, Monroe, Ga.; No. 173, Clifton Mfg. Co., Clifton, S. C.; No. 174, D. E. Converse Co., Glendale, S. C.; No. 175, Inman Mills, Inman, S. C. Order 176 sets ceilings for neoprene coated and cotton flocked flannel made by Hood Rubber Co., Watertonw 72, Mass. Order 177 (Inman Mills), Order 178 (Clifton Mfg.), and Order 179 (Converse) relate also to ceilings for pyroxylin and vinyl coated fabrics.

Amendment 1 to Rev. Order 117, MPR 220—Certain Rubber Commodities—in a slight pricing change permits manufacturers of bathing caps, as an alternative method, to add to ceilings for basic caps the difference between their current factory costs of the specialty cap and of the basic cap.

Amendment 2 to Order 283, MPR 580, makes changes in the preticketing of dress shields by I. B. Kleinert Rubber Co., 485 Fifth Ave., New York, N. Y.

Amendment 8, MPR 82—Wire and Cable—amends the sections treating of zone pricing.

Amendment 16, MPR 598, makes changes in the retail prices of Firestone household mechanical refrigerators.

Last month OPA issued orders exempting or suspending from price control a wide variety of products including: cloth back, pressure-sensitive industrial tape; friction tape and splicing compound; gummed stencil paper; luminous paper tape; truck tire flaps sold for replacement purposes; door mats; rubber, composition, and fabric stair treads.

To avoid any break in the production or delivery of essential military equipment, OPA on June 27 authorized the Army and Navy, or other government agency, to buy articles containing rubber at negotiated prices, without regard to existing ceilings. (Amendment 31 to Supp. Order 129—Exemption and Suspension from Price Control of Machines, Parts, Industrial Materials and Services—effective June 27.) Rubber workers received a general wage increase, but no corresponding price adjustment was made in rubber products, OPA explained. Consequently bids for government contracts were falling off, and Amendment 31 was intended to stimulate deliveries until a general wage-price adjustment could be made. The amendment suspended price control on government purchases of all military equipment containing rubber, such as life rafts, pontoons, airplane parts, and service clothing.

Two changes were made last month in MPR 580. Amendment 3 to Order 98 covers prices for Elasti-Glass men's waterproof jackets and ladies' raincoats made by S. Buchsbaum, Chicago, Ill. Amendment 5 to Order 208 relates to the ceiling price of men's raincoats, products of Climatic Rainwear Co., Inc., New York, N. Y.

(The wartime OPA pricing control expired with June 30, 1946, but these OPA notes are included "just for the record.")

GR-S Inventories Reduced

Inventory controls have been tightened on convector radiation, GR-S, special high-grade and prime western grade zinc, die cast alloy, and sheet aluminum, the Civilian Production Administration announced June 14. Controls were tightened by the June amendment to Priorities Regulation 32, CPA's inventory control regulation. The amendment also made some minor changes for purposes of clarification.

GR-S has been placed under a 30-day inventory limitation because of the critical shortage of this material resulting from current record tire production.

Special high-grade zinc and prime western grade zinc and die cast alloy have also been placed under a 30-day inventory limitation. The two grades of zinc are in critically short supply, and a tendency to accumulate excessive inventories has become evident.

Tire manufacturers may now use a larger amount of natural ruber in making tread repair stock and stripping stock, CPA announced June 21. Tread repair stock of 1/16-inch maximum gage may hereafter be made with 62% natural rubber instead of 50% as in the past. The amount of natural rubber permitted in stripping stock (a type of tire repair material of ⅛-inch maximum thickness) was increased from 50 to 60%. These changes are set forth in amendments to R-1 and to Appendix II (Manufacturing Regulations).

In the body of the order the procedure by which cement for the manufacture of new shoes is obtained and certain regulations covering its utilization are altered.

Minor changes were also made in codes 1 and 3 of Table B (Permitted Products), Code 13-A (Insulation Compounds) of Table B, and definitions and markings of tires and tubes.

Brown Rubber Co., Inc., La Fayette, Ind., at its annual stockholders' meeting May 27 reelected the following officers and directors: E. A. Callanan, president and director; J. H. Buskirk, vice president and a director; Roger D. Branigin, secretary; G. L. Sylva, assistant secretary; C. W. Hickman, Jr., assistant treasurer and director; and C. V. Castor, George W. Leach, George W. McCollough, and Calvin S. Yoran, directors.

EASTERN AND SOUTHERN

New Stock for Plant Expansion

At the annual stockholders' meeting of Rome Cable Corp., Rome, N. Y., on June 5 the financing plan proposed by the board of directors was approved by 73% of the shareholders. This plan involves the issuance of 63,276 shares out of 75,000 shares authorized of a new $30 par convertible preferred stock and an increase in authorized common from 200,000 to 600,000 shares, necessary to provide sufficient shares to allow for conversion of the new preferred stock into common and for such other purposes as the company may deem advisable at some future date.

Company officials stated at the meeting that Rome Cable had a substantial backlog of orders and that current earnings were estimated to be higher than for the same period last year owing to capacity operations, increased efficiency, and overall price relief recently granted by OPA.

The company expects that the new building for its rubber covered wire department, providing 151,000 more square feet to make a total of about 500,000 square feet of floor space, will be completed this summer. The structure will not only house the rubber covered wire department, but will give much needed space for factory production offices, a new laboratory with expanded research facilities, and a cafeteria.

The company, however, is still pressed for space, especially for storage facilities. Consequently with funds received from the new financing program Rome Cable will erect a new building for manufacturing bare wire, to be a two-story structure containing 105,000 square feet of floor space. This addition would enable the company to use the building in which the bare wire department is now housed to enlarge the receiving and shipping departments.

At the stockholders' meeting all directors and officers were reelected as follows: chairman of the board, H. T. Dyett; president, A. D. R. Fraser; vice president and treasurer, H. W. Barnard; vice president, secretary, and assistant treasurer, J. H. Dyett; vice presidents, C. H. Ellis, G. E. Rolston, R. A. Schatzel; comptroller and assistant treasurer, V. W. Collins; assistant comptroller, S. W. Barrett; directorate, H. W. Barnard, V. W. Collins, H. T. and J. H. Dyett, C. H. Ellis, A. D. R. Fraser, J. Inglis, J. L. Loeb, and G. E. Rolston.

Westinghouse Power Show

The Westinghouse Electric Corp., Pittsburgh 30, Pa., presented a show entitled "Productive Power" before the Edison Electric Institute's conference at the Waldorf-Astoria Hotel, New York, N. Y., June 4. The show covered seven modern electrical techniques for manufacturing that would help industry overcome rising costs in materials and labor by producing faster, better, and more economically. In introducing the presentation, C. B. Stainback, manager of Westinghouse's industrial department, listed the seven techniques as follows: high-frequency heating, improved lighting, resistance welding, infra-red heating, furnace brazing, better wiring, and air handling. Tomlinson Fort, manager of Westinghouse's central station sales, declared that installation of these seven electrical processes, along with lesser war-born developments, would increase by 27% the amount of horsepower at the command of each worker over the amount at his disposal during the height of the war production.

The need of adequate and modernized wiring systems in plants was demonstrated by means of a scale-model factory layout containing movable models of electrical and processing machinery. The value of adequate wiring, such as obtained by use of the company's Bus-duct system, was amply demonstrated together with the need and operating principles of power-factor correction and circuit breakers. The other six techniques were demonstrated by means of display booths. High-frequency heating was featured in the exhibit, with a motion picture shown to illustrate the use of induction heating. The use of high-frequency dielectric heating for non-conducting materials, such as rubber, was demonstrated by cementing and heating wood blocks to give satisfactory bonds within short periods of time. A foam rubber mattress was also exhibited as an example of the time saving obtained in curing by means of high-frequency heating.

American Viscose Expanding

American Viscose Corp., 350 Fifth Ave., New York 1, N. Y., on June 8 announced that following authorization by their respective boards, American Viscose and Sylvania Industrial Corp. have entered into a formal agreement for the acquisition of the business and properties of Sylvania by Viscose subject only to the vote of their stockholders and the completion of formalities, expected within 90 days.

Frank H. Reichel was elected chairman of the board of American Viscose, succeeding John G. Jackson, whose resignation was accepted at his request. Mr. Jackson will remain a director and was also elected general counsel of the corporation. Dr. Reichel, president of Sylvania Industrial, has been a director of American Viscose for the past two years and now becomes its chief executive officer.

The board of directors of American Viscose on June 5 approved an appropriation for preparation of the plant site for the company's new viscose rayon staple fiber plant at Radford, Va. This work to be done this year, will include construction of a railroad bridge to connect the main railroad line with the plant, grading of plant site, construction of road from property line to plant, and a storage building. The board authorized a viscose rayon staple fiber plant with an initial capacity of 55,000,000 pounds a year adapted to tie in with a proposed 110,000,000-pound annual capacity plant. It is hoped that construction of the plant itself can be commenced in the Spring of 1947.

Seminar on Rayon

A week-long "Advanced Seminar on Rayon" for deans and instructors from eight of the country's leading textile schools began on June 3 at American Viscose's textile research department at Marcus Hook, Pa. Forty delegates attended the meetings, which covered every major phase of processing rayon, both filament yarn and stable fiber, and the use of rayon in all textile fields. The seminar was conducted under the auspices of the textile research department's education branch, headed by Joseph A. Truitt. The need of a seminar of this type became apparent during the war as a result of the accelerated development of rayon and of rayon processing techniques. The schedule of lectures given at the seminar included: "Research Spins a Yarn," "Rayon — Its Historical Background," "History of Rayon Fabrics," "Plant and Customer Relations," "Rayon at Marcus Hook," "Rayon Fabric Effects," "The Washington Viewpoint," "Defects of Rayon Yarn and Fabric," "Testing for Quality," "Chemical Research by AVC," "Rayon Fibers—Inside and Out," "Industrial Uses for Rayon," "Future Fabrics," and "Rayon Markets Today and Tomorrow."

St. Joseph Lead Co., 250 Park Ave., New York 17, N. Y., has made Harry E. Outcault assistant sales manager of the zinc oxide department.

Westinghouse Scale-Model Factory Layout Demonstrating the Need and Use of New Electrical Techniques in Manufacturing

Houdry Expansion

Further expansion of service facilities of the Houdry Process Corp., New York, N. Y., and the appointment of Claude Peavy to head the company's process design division, have been announced by Arthur V. Danner, Houdry executive vice president.

The process design division has been widely expanded in view of the increasing demands for Houdry service, particularly in the field of the small refineries, Mr. Danner said. The division is set up to perform complete process studies as well as detailed process design in all phases of petroleum refining.

Dr. Peavy, whose broad background of process design experience in catalytic cracking, as well as allied petroleum refining fields, comes to Houdry from Socony-Vacuum Oil Co., Inc., where he was chief process engineer in the refinery engineering division, and prior to that he had been process engineer with E. B. Badger & Sons Co., for nine years. Dr. Peavy was born near Dallas, Tex., and educated at the University of Michigan.

First Machinery Corp., which was forced to move from 819-37 E. Ninth St., New York, N. Y., to make way for a housing project, has found modernized quarters covering 60,000 square feet at 157 Hudson St., New York 13. Fred R. Firstenberg, president of the company, has, moreover, reequipped both the manufacturing and rebuilding divisions of the organization with the latest type of machines. Besides serving the processing industries with rebuilt equipment, First Machinery Corp. will introduce a far greater line of new machines, which will be exhibited at the forthcoming Chemical Show to be held at the Chicago Coliseum on September 10 to 14. This line will include mixers, fillers, stainless kettles, tanks, cappers, conveyers.

Goodyear Sundries & Mechanical Co., Inc., 85 Chambers St., New York 7, N. Y., on June 10 announced the organization of Goodyear Rubber Export Co., 55 Broadway, New York 6, as successor to its export department, under the management of Russel F. Stroming and Arthur H. Fraser.

Golf Ball Manufacturers Association at its recent meeting in New York, N. Y., elected the following officers: president, L. E. Coleman, vice president, A. G. Spalding & Bros., Inc., Chicopee Falls, Mass.; vice president, Philip Young, president, Acushnet Process Co., New Bedford, Mass.; and secretary-treasurer, James Brydon, vice president, Worthington Ball Co., Elyria, O.

The Monroe Sander Corp., manufacturer of Sanco varnishes, lacquers, enamels, and paints, 10-18 46th Ave., Long Island City 1, N. Y., has appointed as assistant president Dudley B. Blake, who recently returned from Army service in the Far East. He will supervise industrial sales promotion and a concentrated national expansion program.

Pennsylvania Rubber Changes

Appointment of Harry B. Keller to the sales staff of the Pennsylvania Rubber Co., Jeannette, Pa., has been announced by R. B. Cave, vice president in charge of sales. Mr. Keller will represent the company in southwestern Pennsylvania and West Virginia. During the war he had served as an officer in the army air forces and before that had been associated with Gulf Oil Co. in the sales department.

Two new members have been added to the sales staff of the athletic goods division, according to H. H. Rice, department manager. Lynn W. Renne will be attached to the Chicago branch. He is a graduate of the University of Illinois and spent 5½ years in the army. Wayne M. Watson will work out of the Atlanta branch. He entered the service in 1942.

New locations for branch office and warehouse in New York, N. Y., have been announced by Pennsylvania Rubber. The New York warehouse is operating at Lehigh Warehouse Corp. of Brooklyn, 184 Kent Ave., Brooklyn, N. Y. After June 1 the New York branch office will be at Pennsylvania Rubber Co., 33 W. 60th St.

Bakelite Corp., unit of Union Carbide and Carbon Corp., 300 Madison Ave., New York 17, N. Y., has acquired the former Inland Rubber Co. plant site, northwest of Ottawa, Ill. Construction of the manufacturing building will be completed as quickly as possible and it is hoped that the plant will be in operation by the first quarter of next year. The purchase of this plant is in line with the corporation's program of expansion to make available increasing quantities of Vinylite plastics for consumer and industrial goods. The new plant will manufacture Vinylite calendered film and Vinylite press-polished rigid sheets. This production will supplement the facilities of Bakelite's main plant at Bound Brook, N. J.

John G. Harrison, Jr., has been appointed chief chemist of the Trenton, N. J., division of National Automotive Fibres. Formerly with Firestone Tire & Rubber Co. and later with Vulcan Proofing Co., Mr. Harrison recently completed a program of research in the polymer laboratories of the Polytechnic Institute of Brooklyn and was awarded a Ph.D. degree.

The Flintkote Co., Inc., 30 Rockefeller Plaza, New York 20, N. Y., on June 11 received the Navy Department Bureau of Ordnance Development Award for distinguishd service to the research and development of naval ordnance during World War II.

Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J., recently honored at its second annual dinner for veteran employes three 50-year Pioneers and 14 25-year employes, and gold service pins were presented to approximately 300 Manhattan Pioneers. The half-century veterans included Charles T. Young, former factory manager, and two plant employes, Andrew J. Gibson and John Dotterweich.

Rayon Cord in Lee Truck Tires

A. H. Nellen, vice president in charge of development and research for Lee Rubber & Tire Corp., Conshohocken, Pa., writing in the April issue of *Lee-dership*, the company's house organ, states that all Lee truck tires are now made with high-tenacity rayon carcasses throughout. While early tests on rayon carcasses, as compared with Double-Life cotton cord carcasses, showed up some serious defects in rayon tires, such as excessive growth, deterioration due to moisture, and others, these troubles have now been overcome to a great extent by improvements in the manufacture of rayon and in handling and processing rayon cord in the tire plant. Lee rayon tires now excel the older-type cotton cord tires in that they run at lower temperatures; the rayon carcass resists such temperatures as are built up in the tire to a much greater degree, causing less heat ruptures and blowouts, and are also much more resistant to stone bruising and impact failures owing to their greater tensile strength.

American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York 20, N. Y., has transferred Joseph Brown, Jr., sales representative for upper New York State, to the paper chemicals department in charge of sales of casein, China clay, satin white, and casein solvents and spreaders. Stuart B. Leigh, recently returned to the company after service in the Navy, succeeds Mr. Brown in upper New York.

Pittsburgh Plate Glass Co., Pittsburgh, Pa., last month marked the fiftieth anniversary of the establishment of its extensive warehousing system. In 1896, just 13 years after plate glass first was produced successfully at its Creighton, Pa., plant, the company acquired eight glass jobbing concerns located at New York, Chicago, Boston, Cincinnati, Kansas City, St. Louis, Milwaukee, and Minneapolis. Pittsburgh Plate was incorporated in 1883.

Advance Solvents & Chemical Corp., 245 Fifth Ave., New York, N. Y., has appointed Burt Wetherbee its sales representative in the rubber and plastics fields for Western New York State. Mr. Wetherbee makes his headquarters at 525 Washington Highway, Snyder 21, a suburb of Buffalo, and is sales representative for General Latex & Chemical Corp. and other companies serving the rubber, textile, and paper industries.

General Electric Co., Schenectady, N. Y., has appointed Harry K. Collins manager of the resin and insulation materials division at Pittsfield, Mass. The position formerly had been held by the late Edgar L. Feininger, who also served as assistant general manager of the chemical department. Mr. Collins, with the company 20 years and recently manufacturing manager of the division in Schenectady, now assumes responsibility for over-all activities connected with General Electric's new silicone resins, oils, greases, rubber, and water repellents as well as its Glyptal alkyd resins and insulating materials.

Cadwell Appointed Director of Research

Sidney M. Cadwell has been made director of research and technical development of United States Rubber Co., Rockefeller Center, New York 20, N. Y., it was announced June 6 by Herbert E. Smith, president. Formerly assistant general manager of the company's tire division, Dr. Cadwell brings to his new position 27 years of administrative and scientific experience in the fields of rubber and plastics.

A native of Boseman, Mont., Dr. Cadwell attended the University of Chicago, where he received his B.S. in 1914 and Ph.D. in 1917. During World War I he served as captain in the Chemical Warfare Service. In 1919, Dr. Cadwell joined U. S. Rubber as a research chemist in its general laboratories. In 1930, after 11 years of rubber and chemical research, he became director of tire development for the company with headquarters at Detroit, Mich. Then last year he was appointed assistant general manager of the company's tire division with responsibility for production at the company's five major tire and tube plants. In his new position he will make his headquarters in New York.

Pach Bros.

Sidney M. Cadwell

Dr. Cadwell has contributed much to scientific advancement in the rubber industry. Some 65 patents are to his credit, including the development of improved antoxidants. His research in rubber has added many miles of tread wear to present-day tires, and his name is on most golf balls because of his part in the developing of the Cadwell-Geer cover. During the war years he did notable work in the development of synthetic materials and was among the first to recognize the value of Butyl for inner tubes and the use of rayon cord for improved tires.

During his career Dr. Cadwell has served as chairman of the Division of Rubber Chemistry and of the Detroit Section, American Chemical Society.

Willis A. Gibbons, who had been director of research and technical development for the company, became associate director. He will devote his entire time to scientific rsearch.

A. A. Wilcox has been appointed manager of jobbing sales in the wire and cable department of U. S. Rubber. Mr. Wilcox, associated with the company since 1937, was formerly manager of industrial relations and industrial engineering in the company's wire manufacturing plant at Bristol, R. I. As manager of jobbing sales, he will coordinate the sale of electrical wire, cables, cord sets, and plugs to wholesalers.

Other U. S. Rubber News

Products of the mechanical goods rubber industries in the Los Angeles, Calif., area will reach a peak value of about $92,000,000 this year, approximately 40% higher than the previous record of $68,320,718 made in 1941, according to W. S. Long, Pacific Coast manager of U. S. Rubber. He also predicted that about 90,000 tons of synthetic and natural rubber will be used by rubber plants in the Los Angeles area in 1946, about 18,400 tons more than in 1941.

Lt. Gen. E. B. Gregory, Quartermaster General of the United States Army, has awarded a certificate to John B. Dickson, of U. S. Rubber, for his "outstanding contribution in the war effort as a member of the Military Planning Division." As a technical consultant in the testing of athletic equipment, Dr. Dickson wrote specifications and supervised tests on baseballs, footballs, baseball bats, and other sports articles used by the Army in its recreation program.

Acting to relieve the housing shortage in Hogansville, Ga., and Winnsboro, S. C., U. S. Rubber last month announced plans for the construction of 131 houses and apartments for plant personnel in the two communities. The program calls for 60 houses in Hogansville and 71 houses and apartments in Winnsboro. All are expected to be ready for occupancy within 90 days.

The plants employ a combined total of more than 3,000 men and women. They produce annually more than 60 million pounds of high-tenacity tire cord and heavy duck for shipment to the company's rubber plants across the country. Hogansville is also the home of Asbeston, a flameproof fabric used in the manufacture of fire-fighting suits, burnproof ironing board covers, and other products. Winnsboro produces Us-tex, a cotton yarn treated with chemicals to increase its strength as much as 70%. This product is being used extensively in the manufacture of numerous industrial products, such as threads, hose, V-belts, and webbings.

An inflatable rubber boat, especially designed for civilian use, it now in production by U. S. Rubber for early delivery. The new-type boat will be particularly practical for fishing and hunting in remote spots, for sunning and sports on lakes and the seashore, and for use as a dinghy on yachts. Since it is eight feet four inches long and four feet two inches wide, it will accommodate four people comfortably. The boat can be set up and inflated, or taken down for packing, by one man in 10 minutes. Large valves are placed so that air can be pumped in quickly, or rolled out easily after use. The boat is made of heavy duck, coated on both sides with a synthetic rubber impervious to gasoline and oil and highly resistant to sunlight, aging, and abrasion. The boat is divided into two airtight chambers for safety, in case one should be punctured. Two rigid seats, easily removable, are properly located for rowing. There are handling lines on each side and a tug-loop on the bow. Other equipment includes collapsible aluminum oars, large hand pump, carrying case, and instruction leaflet. A motor bracket is also available as an accessory and enables the boat to be used with an outboard motor up to three horsepower. In its carrying case the inflatable boat and its equipment weigh 37 pounds. As the carrying case is only 32 inches long and 14 inches in diameter, the boat can be carried easily in a car.

Continental Carbon Co. and **Panhandle Carbon Co.** have ordered 20 additional hopper cars to expedite shipments of their dustless, pelleted carbon blacks for which the Witco Chemical Co., also of 295 Madison Ave., New York 17, N. Y., is sole selling agent. These cars have been ordered from the General American Transportation Co. and delivery is promised later in the year. The new cars, added to those now in use, will permit more efficient handling and therefore more prompt shipment of the companies' carbon blacks. Because of the larger production of rubber products, especially tires, due to stepped-up efficiency of existing plants, additional fabricating facilities, and greater use of carbon black with synthetic rubber, the demand for dustless Continental and Witco furnace and channel blacks has greatly increased.

Intercontinental Rubber Co., Inc., 745 Fifth Ave., New York 22, N. Y., has announced that on July 1, C. L. Baker retired as president of Intercontinental and its American subsidiaries and became chairman of the Board of Directors of Intercontinental and also of its principal subsidiary, Continental-Mexican Rubber Co. Mr. Baker was succeeded as president of each company by Alexander E. Edelen, Jr., a vice president in charge of the operations of Continental-Mexican Rubber Co., the subsidiary engaged in producing crude guayule rubber in Mexico by extraction from wild guayule shrub and now developing in that country a plantation for raising guayule shrub under cultivation. J. H. Linxweiler has become secretary in addition to his duties as treasurer of Intercontinental and its American subsidiaries, succeeding the former secretary, H. G. Atwater, who continues as vice president.

W. C. Hardesty Co., Inc., manufacturer of stearic acid, red oil, and glycerine, 41 E. 42nd St., New York, N. Y., has appointed William G. McLeod general manager of its Dover, O., plant. He succeeds C. F. Williams, who was connected with the plant for six years and is now stationed in Washington, D. C. Mr. McLeod, who was chemical director of the Hardesty company since September, 1945, is a past president of the American Oil Chemists' Society and is a member of the American Chemical Society, American Institute of Food Technologists, and the American Association for the Advancement of Science. A graduate of Clemson College, Mr. McLeod's other business experience includes service with oil mills and meat packing concerns. He is also the author of many papers on oils and fats.

Du Pont Advances Several

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., on June 1 appointed Frederick H. Weismuller assistant general manager of the pigments department, succeeding Crawford H. Greenewalt, recently made a vice president and member of the executive committee. Mr. Weismuller had been director of sales for the pigments department since 1944. He had joined Krebs Pigment & Chemical Co. in 1926, and that company became associated with Du Pont in 1929. Mr. Weismuller was appointed superintendent of the Krebs plant at Newark, N. J., in 1932, and of the Edge Moor, Del., plant in 1934. He became assistant production manager of Krebs pigments department, now the pigments department, in 1935, and production manager in 1940.

Five other organization changes were announced June 20 by duPont's pigments department.

David H. Dawson has been appointed director of sales, replacing Mr Weismuller. Dr. Dawson, assistant director of color research at the Newark, N. J., plant since 1944, previously was a research supervisor at the Newport, Del., and Baltimore, Md., plants.

James E. Booge has been made chemical director of the department, a new position with headquarters in Wilmington. Dr. Booge was director of research on white pigments since 1935, having previously been a chemical director of the Krebs Pigment & Color Corp. He first joined duPont as a research chemist at the Experimental Station in 1917.

E. R. Allen becomes senior research associate reporting to the chemical director. Dr. Allen came to the company in 1919 and has been director of research on colors at the Newark plant since 1923.

I. J. Krchma, previously assistant director of research at the Newport plant, has been made assistant chemical director for white pigments with headquarters at Newport. W. F. Spengeman, research supervisor at the Newark plant, has been appointed assistant chemical director for color pigments with headquarters at Newark.

Benton Dales, whose retirement as head of the latex section of the du Pont rubber laboratory was effective July 1, will continue to serve the latex industry as consultant. His permanent address is 25 Truepenny Rd., Bowling Green, Media, Pa. Dr. Dales was for some time head of the chemistry department of the University of Nebraska. His connection with the rubber industry began in 1918 when he entered The B. F. Goodrich Co. research laboratories. His work in the field of latex technology has been continuous since the start in 1925 of the Goodrich development of electrodeposition and dipping processes. In 1929, Dr. Dales became associated with Premoid Products, Inc., and assisted in developing its latex impregnated paper products. He has been identified since 1931 with the du Pont development of neoprene latex from laboratory sample to its present status.

Carl S. Williams, chief supervisor of duPont's rubber laboratory at Deepwater Point, N. J., also retired July 1. A native of Cleveland, O., he received his B.A. in chemistry from Ohio State University in 1913. Joining the Roessler & Hasslacher Chemical Co. in 1915, Mr. Williams worked on rubber chemicals, particularly accelerators, and became director of the accelerator and rubber service department. Soon after that company was acquired by du Pont in 1930, Mr. Williams was transferred to the rubber laboratory in charge of personnel and laboratory operations. He has made many improvements in the science of rubber testing and in the development of natural and synthetic rubber compositions.

Export Controls on Tires

Current Export Bulletin No. 341, June 14, 1946, reduces the validity period of licenses to export tires and tubes. Thus until further notice all individual licenses to export tires and tubes classified on the Positive List of Commodities under Schedule B Nos. 206000, 206200, 206300, and 206400 will be issued for a validity period of only six months. No outstanding individual export licenses, covering the exportation of such tires and tubes, which were validated prior to June 14, will be valid after December 14, 1946. Outstanding licenses which expire prior to that date are not affected by this announcement. Furthermore, exporters are reminded that export licenses which have expired or which will not be used must be returned promptly to the Requirements and Supply Branch, Office of International Trade, Department of Commerce, Washington 25, D. C.

The Office of International Trade, moreover, in Current Export Bulletin 334, announces that beginning with the third quarter 1946 the Limited Distribution License (LDL) procedure will be extended to cover exportations of new passenger-car, truck, and bus tires. Schedule B Nos. 206000 and 206200, by manufacturers and traditional exporters of these commodities. This procedure will apply to new passenger-car, truck, and bus tires of all grades (including factory "seconds") except military surplus and factory reject tires, but will not apply to used and recapped tires. Authorization for the exportation of tires under this procedure will carry with it the authority to export with the tires an equal number of tubes to be used therewith.

According to Bulletin 347, the following are removed from the Positive List and placed on general license for exportation to Group K destinations: rubber scrap, synthetic and crude; tires and tire parts; tubes and tube sections.

Revertex Corp. of America, 274 Ten Eyck St., Brooklyn 6, N. Y., has transferred its plant and laboratory to newly constructed, modern quarters on New South Rd., Hicksville, L. I. The new building, first of a series of proposed units, on a 20-acre section of land along the main line of the Long Island Railroad, has shipping facilities for both truck and rail deliveries. The new one-story structure, moreover, is "tailor made" to meet the requirements of handling and compounding latex for volume production. In the east end of the building a laboratory for research and development work is located on a mezzanine floor.

Hewitt Rubber of Buffalo, N. Y., division of Hewitt-Robins, Inc., has begun production of foam rubber cushions for the modern luxuy cruisers built by Richardson Boat Co., Inc., North Tonawanda, N. Y. The Restfoam cushions will be standard equipment on each boat. Hewitt technical men and Richardson engineers worked together on the design of the new cushions for the 25-foot Utility Sedan model boats now in production. The Sedan model is designed so that the two dinette cushions can be quickly converted to a bed. The lounge seat can be converted into two single berths, thereby giving the cruiser a sleeping capacity of four persons. Engineers at Hewitt and Richardson now are working on design of the Restfoam cushions for the new 33-foot cruiser, for production early in 1947.

Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J., through Leo Sklarz, sales manager pigment department has announced that E. J. Hildebrand has joined the pigment department as an assistant sales manager. Mr. Hildebrand has been associated with the Glidden Co. for 24 years and has been sales manager of the dry color department of the A. Wilhelm Co. Division for the last 12 years.

Elizabeth J. Cole, Calco librarian, was installed as president of the Special Libraries Association at the annual conference of the organization in Boston on June 15. Miss Cole has been with Calco since August, 1930, where she presides over one of the country's outstanding industrial libraries.

The Okonite Co., Passaic, N. J., has appointed Robert K. Spofford purchasing agent to replace the late George S. Hayes. Mr. Spofford, formerly assistant purchasing agent, who will also be in charge of purchasing for The Okonite-Collender Cable Co., Inc., Paterson, N. J., has been an active buyer for ten years. He has been with Okonite since 1943.

Celebrating Centenary

New York Belting & Packing Co., Passaic, N. J., is celebrating its one hundredth anniversary. It was in 1846, seven years after rubber was first vulcanized successfully, that a group of industrial pioneers established a small factory in Sandy Hook, Conn. This enterprise prospered, and on June 15, 1856, it was incorporated in Connecticut as the New York Belting & Packing Co. by William Judson, John H. Cheever, and A. W. Thompson. In 1882 an additional plant was established in Passaic, and eight years later all manufacturing was moved to Passaic, and the Sandy Hook plant discontinued.

During a century of existence New York Belting has specialized in the development and production of belting, hose, packing, and other mechanical rubber products used by industry. All goods are marketed through industrial distributors to the consuming trade. Some distributors have been handling the company's line as long as 60 years.

Commenting on the centennial, B. F. Ruether, vice president of the company, emphasized the importance of research and development. He said the company is accelerating its postwar research program leading toward the development of new products and the improvement of the regular line of mechanical goods.

OHIO

Financing Program Approved

The shareholders of The General Tire & Rubber Co., Akron, at a special meeting late in May approved the new financing program submitted to them earlier in the month. An increase from 85,000 to 150,000 shares of the present preferred stock was authorized, 25,000 shares of which are to be issued now, and the balance may be issued at the discretion of the board of directors subject to certain restrictions included in the increased authorized first preferred stock. In addition, 30,000 shares of a second convertible preferred stock were authorized, and authority was granted for the issuance of 25,000 shares at this time. Dividend rates, redemption provisions, etc., of the new stock are subject to action to be taken by the board shortly after the special meeting. The purpose of the new financing is to secure additional operating capital for the greatly expanded operations of the company. Stockholders also authorized an increase in the number of directors from 9 to 11.

In the thirtieth year of its existence, General is expanding both in the tire fields and in other lines of manufacture. The company owns the Yankee Network, the country's fifth largest radio chain; recently purchased the Pennsylvania Rubber Co. and obtained a large minority interest in the Mansfield Tire & Rubber Co., and has begun manufacture of many new products. In California, General is making rockets for the military forces and for civilian use on planes and in meteorology. It also is making plumbing fixtures and experimenting with a new hospital bed which greatly reduces a nurse's work by a system of push buttons. First production of a combination refrigerator and freezing unit is expected to come off the line in Morrison, Ill., this month as General enters this new field with Frostair. Furthermore a new plant for mechanical goods has just been opened at Logansport, Ind.

With the acquisition of Pennsylvania and a large interest in Mansfield, General has entered the mass distribution field in the tire industry for the first time.

Sales of General Tire for the first six months of the company's 1946 fiscal year were greater by $5,000,000 than sales in the biggest prewar year, according to Vice President L. A. McQueen. For the six-month period ending May 31, General reported sales in excess of $49,000,000. The biggest prewar year was 1941, when a total of almost $44,000,000 was rung up. The figures do not include sales of the Yankee Network, or of the foreign plants, or fees received for operation of a government-owned synthetic plant at Baytown, Tex.

General Tire Appointments

Last month several personnel changes were announced by the company.

J. J. Goldie was made director of administration, with two executive assistants, H. L. Mollenkopf, general office manager, and R. W. Henderson, manager of branch offices. Mr. Goldie, with General Tire two decades, started as assistant credit manager and became, successively, manager of branch office operations and general office manager. Mr. Mollenkopf began with the company 15 years ago in the cost department and was its auditor at a government plant in Mississippi when he went into the army. Following his discharge he returned to the company on special assignment. Mr. Henderson went to work as a clerk in General's New York branch 10 years ago. After three years in the army he returned to New York, but has been transferred to Akron to assume his new duties.

Two returned naval officers have been added to the Central Division sales force. J. J. Mulcahy, whose pre-war experience was in the company's special products department, is now stationed in Akron; while Reed Griffith, who worked in the adjustment department before going into the navy, has been assigned to western Pennsylvania.

Appointment of 20 refrigeration distributors to handle the Frostair Duplex, combination refrigerator and freezing unit, was revealed by Max M. Gilman, general manager of the Frostair division of General Tire.

K. D. Smith Returns to Akron

After serving National-Standard Co. as plant manager of the Worcester Wire Works Division, Worcester, Mass., for nearly two years, K. D. Smith has returned to Akron, to the newly acquired offices of National-Standard at 47 W. Exchange St. In his new assignment with the company, Mr. Smith will work in direct contact with the rubber and automotive industries.

His automotive experience includes a background of 17 years with the B. F. Goodrich Co., where he was assistant manager of factory operations. During part of the war years Mr. Smith was on the staff of the Ordnance Branch of the War Department in Washington and Detroit as a consultant on rubber products. He is also a past president of the Tire & Rim Association, Inc., and a member of the Society of Automotive Engineers and the American Chemical Society.

The Timken Roller Bearing Co., Canton 6, has announced that Richard C. Baker, formerly manager of the Canton office of Ernst & Ernst, public accountants, has become associated with Timken as an executive assistant. Among other duties Mr. Baker will supervise all tax problems and affairs and will, from time to time, make special studies of accounting and related matters. Besides he will assist members of the Timken organization in various matters pertaining to their financial and business affairs.

The Mansfield Tire & Rubber Co., Mansfield, has elevated M. L. Bayer from the position of superintendent to that of divisional superintendent, with Wm. J. Dormaier moving up from the rank of foreman to the post of superintendent.

Seiberling Rubber Co., Akron, has advanced Wilfred Andrew, general production superintendent, to factory personnel administrator, and Leo Pettitt to the office of production superintendent. Both men are Seiberling "old-timers."

Goodyear Personnel Changes

New appointments as staff men in the Akron tire service department of the Goodyear Tire & Rubber Co. are K. F. Bott and H. W. Rulshizer, formerly field service representatives. Mr. Bott served five years as service representative at Rochester, Buffalo, and Newark districts prior to enlisting in the army in September, 1942. For the past 18 months, Mr. Rulshizer was tire field representative with headquarters at Fargo, N. D. He has been with Goodyear nine years and has been stationed at Kansas City and Omaha, in addition to Fargo.

Robert S. Smiley has been made assistant manager of the company's automotive products division. Before returning to Akron, he had been in charge of mechanical goods sales at Goodyear's plant in St. Marys since 1942. He joined the company in 1928 and has held several important sales posts, including a year in Detroit as Goodyear's mechanical goods representative.

Don Gifford, who during the war was chief engineer of Goodyear's tire factory at Norrkoping, Sweden, has returned to the company's parent plant in Akron for reassignment. His Swedish bride accompanied him home. Mr. Gifford became associated with Goodyear in 1929 as an apprentice mechanic. He received additional training on the company's engineering squadron, and when Goodyear built its Swedish plant in 1938, he was sent over to install machinery. He remained as a staff engineer, becoming chief engineer in 1940.

Appointment of K. L. Reynolds as manager of the efficiency division of Goodyear plants in Akron was announced in May by F. J. Carter, director of personnel. Mr. Reynolds joined Goodyear in 1927, shortly after graduating at the University of Illinois. From 1930 to 1935 he headed the company's employment division in Akron and in 1937 was made personnel manager of the tire plant in Jackson, Mich. Mr. Reynolds was recalled to Akron in 1940 and since then has held several posts in the efficiency division. Reporting to him are the section heads of personnel efficiency, production wage efficiency, engineering wage efficiency, and the manager of the company's suggestion system.

Max F. Moyer, international balloon race figure and a colonel in the Army Air Forces during the war, has returned to his post at Goodyear as assistant manager of the flooring and builders' supply department of the chemical products division. He will report to Otto C. Pahline, manager of the flooring department and will share responsibilities with A. W. Biggs, who during Mr. Moyer's absence carried full responsibilities. Mr. Moyer joined Goodyear in 1926 and left for war service in May, 1942.

Edward F. Rossiter, with the company since 1927 and recently serving on supervision in molded goods and V-belt departments, has been assigned to Goodyear-Australia as superintendent of the mechanical goods division, in charge of production and design. He succeeds C. H. Maxwell, who has headed mechanical goods operations in Australia since 1930, and who is returning to Akron for reassignment.

Honorary degree of doctor of science "in recognition of distinguished service to humanity" was conferred upon Paul W. Litchfield, chairman of the board,

Goodyear Tire & Rubber Co., by the University of Akron during commencement exercises held June 14 at Akron Armory. Presentation of the degree by Dr. H. E. Simmons, university president, followed Mr. Litchfield's commencement address in which he outlined to 130 graduating students their opportunities and responsibilities.

Ian D. Patterson has been assigned to the newly created post of assistant manager of Goodyear's chemical product development division. Mr. Patterson, who will be assistant to C. W. Walton, holds an A.B. degree from Albion, Mich., college, and a B.S. degree in chemical engineering from the University of Michigan. He started with Goodyear in 1921 as a chemical engineer and tire compounder. From 1927 to 1936 he was chief chemist and development manager for Goodyear Tyre & Rubber Co., Wolverhampton, England. Returning to the United States in 1939, he was superintendent for three years at Goodyear's Pliofilm and molded rubber goods plant, St. Marys, and during the war was assigned to military products engineering and tire process development work. Mr. Patterson is a member of American Institute of Chemical Engineers, American Chemical Society, and a fellow of British Institution of the Rubber Industry.

A. B. Matthews has been made personnel and safety manager of Goodyear's synthetic rubber division, embracing plants in Akron, O., Los Angeles, Calif., and Houston Texas. Mr. Matthews has held several personnel posts since joining Goodyear in 1925.

Succeeding Mr. Matthews at Goodyear Aircraft Corp. is Charles Jones, who becomes employment manager of office and production personnel. His most recent post was veterans' counselor at Aircraft. His assistants are A. E. Putnam and Glenn E. Mitchell.

W. A. Lovett, San Antonio, Tex., district manager since January, 1943, has been named New Orleans district manager succeeding R. J. Thoman, who has resigned to enter business for himself. L. W. C. Dye, assistant district manager at Kansas City for the past 3½ years, has been promoted to manager of the San Antonio district. Replacing Mr. Dye at Kansas City is O. S. Whitaker, formerly assistant to J. A. Bailey, Goodyear's South-Central sales division manager, with office in Dallas, Tex.

Akron-born Clarence R. Bollinger, vice-president and secretary - treasurer of Goodyear's plant in Argentina, recently completed four decades of service with the company. Presentation of a 40-year service pin was made by Mr. Litchfield, in whose office Mr. Bollinger began his career as a messenger in 1906.

Purchasing's highest honor, award of the J. Shipman Gold Medal, this year was made to George E. Price, Jr., Goodyear purchasing agent, at the national convention of the National Association of Purchasing Agents, held May 27-29 at Chicago, Ill. Award was made for "modest, unselfish, sincere and persistent efforts for the advancement of purchasing and for able assistance and guidance to purchasing agents in their endeavors." Past president and director of the Association, Mr. Price is presently a member of a purchasing agents' committee on economic development and chairman of the business survey committee of the Association; and also serves on the Association's national advisory council and committee on education.

Improved Products Developed

Production of all sizes of passenger-car tires of 6.50-16 size and larger with an especially developed cord known as Rayotwist, made of rayon filaments, has been announced by Goodyear. Although the company has been making increasing numbers of passenger car tires with Rayotwist fabrics ever since federal government restrictions were amended on November 15, 1945, announcement of the change-over to rayon tire cord was delayed until substantial production could be attained. The Rayotwist tires, for the present, bear no special identification and are sold at the same prices as Goodyear tires of comparable sizes made with cotton cords. Advantages claimed for Rayotwist cord are that it is lighter and stronger than the former cotton cord, that it has increased resistance to heat generation in high-speed service, and that it gives substantially increased tire mileage because of cooler running. Future production of Rayotwist tires will depend entirely upon the amount of rayon filament available. It was pointed out that the present supply of rayon filament was limited to such an extent that continuous production of the sizes now being manufactured could not be definitely promised.

The important role played by the pneumatic tire in speeding up the construction of new highways and other earth-moving projects was told to a group of inter-American highway engineers on their visit to the world's rubber capital. A group of 21 representative highway officials from 16 Latin American republics, chosen from hundreds of applicants, spent May 27 and 28 at the Goodyear plants in Akron. Also in the party were two road engineers from China and one from India, in addition to Charles M. Upham, engineer-director of the American Road Builders Association, and four other members of his staff who are sponsoring a 2,000-mile study tour of the Midwest States in cooperation with the State Department, Office of Inter-American Affairs, Public Roads Administration, and Pan-American Highway Confederation. Hosts to the visitors at Goodyear were President E. J. Thomas, J. T. Callaway, assistant to the vice president of Goodyear and president of the manufacturers division of the ARBA, and F. T. Magennis, vice president of the Goodyear Tire & Rubber Export Co.

Tours through the plants included a visit to the departments where giant earth-mover tires weighing nearly a ton are made for use on a wide variety of American road construction machinery. The visitors also saw Goodyear's rim plant, where a broad range of rims is manufactured from small sizes weighing as little as 5½ pounds up to giant rims weighing 754 pounds and designed for tires up to 30.00-33. The road engineers also attended instruction sessions on elements of tire construction, care, and maintenance, conducted by I. B. Goble, assistant manager of Goodyear Export's tire department. Synthetic rubber will continue to be a vital factor in tire construction with production short cuts and economies that may be effected, Mr. Goble predicted. At present all Goodyear truck tires and tires for earth-moving and grader machines in the United States are being constructed with rayon cord, the engineers were told, and rayon is also being used for tires in Goodyear factories throughout the world.

One of the few Goodyear engineered conveyer systems that have remained close to home, a portable field belt operating on a sectionalized idler system and an 80-foot lift conveyer, is producing 1,500 tons of sand and gravel daily at the Rubber City Sand & Gravel Co. in Akron. The system uses approximately 1,700 feet of 24-inch belting and consists of a field belt which services a power shovel in the sand pit. This belt conveys the sand to a second field belt which hauls the material to the lift belt. In praising the speed and efficiency of the belt system, Hal Knight, vice president and general manager of the Rubber City company, pointed out that the seven-ply fabric lift belt has been operating nearly five years without any noticeable wear.

Goodrich Appointments

Several appointments in the associated lines sales division of The B. F. Goodrich Co., Akron, were announced last month by M. G. Huntington, division assistant general manager.

Ernest P. Weckesser, with the company since 1916 and since 1943 in charge of selective service and veterans' employment programs, has been assigned a new territory of all Ohio south of Akron, West Virginia, Kentucky and part of Indiana, with Akron headquarters.

W. C. James, recently returned from nearly three years of naval service, becomes representative in the Chicago territory, succeeding Byron L. King, who has gone into business for himself. O. B. Volz, representative in the northwestern territory with headquarters in Minneapolis, has been transferred to the southwestern territory with headquarters in Atlanta, Ga., where he succeeds J. P. Floyd, who also has entered business for himself. Mr. Volz is succeeded at Minneapolis by G. W. Thompson.

J. C. Billings has been appointed supervisor of tire distribution for Goodrich's replacement tire sales division, succeeding the late R. R. Huston. With the company 20 years, Mr. Billings had been sales manager of industrial tires for the last two years. He had previously held various posts in the tire requirements department.

G. A. Geer has been appointed manager of the Seattle district of the Goodrich replacement tire sales division, succeeding Harry M. Baker, who held the post since 1931, but has retired after 33 years with the organization. Mr. Geer joined the company in 1924, in the credit department, where he held several positions, including the credit managership of the company's New York district. He went into the sales organization in 1942 and since 1943 had been a representative of the petroleum company tire sales department.

Several changes in the automotive, aviation, and government sales divisions also were announced last month. William G. Zink has been named assistant manager of the Los Angeles district. Previously in charge of the Dallas district, he is succeeded by Euell E. Bost, with Texas, Mississippi, and Louisiana as his territory. J. Ellis Huffman has been placed in charge of a new district established at Tulsa, Okla., covering Oklahoma and Arkansas as well as cer-

tain counties in South Dakota, Illinois, and Iowa. James N. Davis has been assigned to the Cleveland office as an additional automotive and aeronautical representative, and William R. Blake, formerly in the Washington office, has been given the same assignment in the San Francisco district.

Harold R. Linebaugh has been appointed the new buyer and merchandiser for electric refrigerators, ranges, home freezers, water heaters, and traffic appliances for Goodrich. He comes to this position after service with the U. S. Army as a contracting officer and later as chief of the termination section in the Michigan and Ohio Central District. He has had 20 years' appliance experience in the retail and wholesale trade.

Appointment of Dr. Rex H. Wilson, of Akron, as medical director of the Goodrich company, succeeding Dr. Donald B. Lowe who died March 2, was announced by T. G. Graham, vice president. Dr. Wilson practiced diagnosis and internal medicine in Akron for five years before entering military service.

Harry N. Stevens, coordinator of the Goodrich research division, Akron, will be an observer at the coming atomic bomb demonstration off Bikini island. He is a member of a group of civilian scientists invited to witness the tests and report their findings to the government.

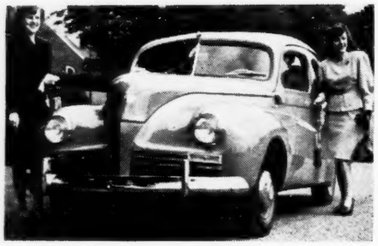
Alfred Cutler has been appointed European sales representative of the International B. F. Goodrich Co., with headquarters in Switzerland. When the factory of the N. V. Rubber Fabriek Vredestien, The Hague, Holland, which will manufacture Goodrich-brand tires, is completed, Mr. Cutler will become sales manager for that country and supervise exports of the company to the European trade. Sales representative of International Goodrich in the Far East for 10 years before the war started, Mr. Cutler had been in industrial products sales of the domestic company in the Philadelphia district for the last several years.

G. K. Ryan has resigned as manager of sales for elastic yarn, rubber thread, and golf ball products at Goodrich. Mr. Ryan has a continuous service record with the company since January, 1911, having served in many capacities including assistant buyer, supervisor of costs, manager of factory operations in the production of rubber sundries, surgical goods, fan belts, thread, golf balls, and elastic yarn. He held his last position since 1939 and during the war, in addition, directed Goodrich sales to the Chemical Warfare Service. Mr. and Mrs. Ryan expect to spend several months on their Bobby-Vernon Farm in Coshocton County, enjoying a much needed rest before making any definite plans for the future.

George Keith Funston, president of Trinity College, Hartford, Conn., has been elected a director of the Goodrich company, according to David M. Goodrich, chairman of the board.

Recent Developments

A hand-built passenger automobile designed and engineered from the ground up by Goodrich to take full advantage of the inherent possibilities of its Torsilastic spring was recently unveiled in Detroit and put through its paces in test rides for automotive engineers and the press. Company spokesmen explained that although this particular vehicle is an experimental one, the principle of the Torsilastic spring had progressed far beyond the experimental stage during the war when they were used on LVT's, the 20-ton amphibious, tracked landing vehicles. A larger version of the spring has been in volume production for months and is being used in new urban buses of the Twin Coach Co. Even before the war, several conventional passenger autos had been equipped experimentally with Torsilastic springs with very favorable results. Primary objectives of Torsilastic springing, particularly for light-model autos, that Goodrich engineers believe can be achieved are an inherently low degree of harshness and low noise level, more comfortable riding, minimum of maintenance, and long life with low operating cost.



Experimental Car Constructed by Goodrich Using Its Torsilastic Rubber Spring Suspension

One of the features of the demonstration car is a constant-level device applied to all four wheels, to hold the chassis at a designed level regardless of load changes. Torsion-rubber suspension lends itself particularly well to the use of constant-level mechanism, the manufacturers claim. In addition, the car features the use of special-purpose synthetic rubbers in many other mechanical elements, and the interior is completely finished with the company's Koroseal. It was pointed out that the Torsilastic spring is not confined to vehicular springing, but is also being applied to scores of non-vehicular uses such as swivel chairs, porch swings, built-in ironing boards, truck tail gates, and others. Annual production of the springs to date has been between four and five million dollars in volume, and present production is rapidly overtaking the high wartime volume.

A new type of hard-surface floor covering, manufactured by the Sloane-Blabon Corp., Trenton, N. J., under technical supervision of the Goodrich Co. and using the latter's raw material and its Koroseal end-product trade name, is being put on the market by the flooring company. The material embodies all of the qualities of durability, flame-resistance, colorability, and resistance to wear and weather for which Koroseal is noted, according to L. H. Chenoweth, manager of plastic products sales for Goodrich. It is a form of Koroseal unsupported by any fabric, and is available in square flexible tire form and in a wide range of brilliant solid colors. In one test simulating the "denting" effect of furniture casters, the Koroseal floor covering showed but 0.5% deformation after 54,000 strokes; whereas the best of conventional hard-surface floor materials had been broken up at 17,000 strokes. Somewhat higher priced than linoleum, the new flooring will find its market principally in hotels, hospitals, offices, ships, theatres, airports, food-processing industries, and generally where long wear and minimum maintenance are of greater importance than original cost, said Houlder Hudgins, president of Sloane-Blabon Corp. The Koroseal material will be formally introduced at the midsummer furniture markets in New York, Chicago, Los Angeles and San Francisco, and will be distributed through the flooring company's nationwide sales network.

Firestone Announcements

To independent retreaders who use Firestone camelback and repair materials, Firestone Tire & Rubber Co., Akron, is furnishing free merchandising, advertising, and engineering helps. Announced by a letter to retreaders from J. W. Hodgson, manager of treading and repair material sales for Firestone, the program will include large enameled signs, banners, window spots, tire inserts, tire spotting cards, display cards, direct mailing pieces, and price cards. These merchandising aids will not carry any Firestone identification, but are designed to enable the retreader to merchandise his own product and retain complete independence. The program also includes sales training bulletins to educate the retreader's organization properly to sell retreading to the car owner. Under this program Firestone is also making available its tire retreading and repairing shop manual, a loose-leaf book with provisions for revisions, which consists of 13 sections covering every problem encountered in the retread shop. Included in the book is the maintenance and proper installation of equipment as well as the steps and methods of retreading and repairing tires. Firestone is also including in this program a dealer packet of merchandising and advertising helps which the retreader can supply to his dealer accounts to assist them in securing more retreading business.

Lee R. Jackson, executive vice president of Firestone, has announced the development of a greatly improved Butyl rubber compound for the manufacture of inner tubes. Definite proof of the superiority of the Firestone Butyl tube over rubber heretofore used in tubes came as a result of an inspection made after five strike-bound automobile factories had resumed operations. The tests, made on cars which had been standing in storage for 100 to 113 days, revealed that air-pressure loss in cars equipped with the Butyl tubes was negligible. Pressure loss on tires equipped with other synthetic tubes amounted to from 50 to almost 100%. At one factory where finished automobiles had been standing for 113 days, the Firestone Butyl tubes showed an average pressure of 30 pounds; while the other tubes had deflated to a 17-pound average. Surveys in two other factories, where only Butyl tubes were used, showed that averages of 32 and 27 pounds were maintained, and only a slight loss from the original pressure was noted. At another factory where the cars had stood for 100 days, the Butyl tubes held to 30 pounds' pressure; while 40% of the other tubes were flat. Because it is the practice to overinflate tires at automobile factories until the assembled cars pass through inspection, no accurate check was possible on the original inflation of the tires examined.

Norman B. Stevens has been made Chicago manager of the manufacturers' sales department for Firestone. He joined

the company in 1917 as a salesman at Des Moines, Iowa, and has been manufacturers' sales representative in the Chicago area since 1933. In his new position, Mr. Stevens will direct Firestone contacts with the farm equipment, earth moving machinery, passenger-car and truck manufacturers in the Chicago territory.

Brig. Gen. Hermon F. Safford recently was elected executive vice president of the Ohio Rubber Co. of Willoughby, O., and Long Beach, Calif. Brig. General Safford was rubber director of the U.S. Ordnance Department during World War II.

Pharis Tire & Rubber Co., Newark, according to Hynes Pitner, vice president in charge of sales, has opened at Carlisle, Pa., a Pharis Service Store to serve dealers in south central Pennsylvania and Northern Maryland. This is the third unit to be opened by the company; others are in Newark and Columbus, O. Mr. Pitner stated that these stores are being opened only in areas not covered by Pharis jobbers.

Paul Love has been assigned to manage the Carlisle wholesale store. He has long been identified as a salesman with the industry, except during the war years when he served as a foreman in a Pennsylvania steel fabricating plant. Salesmen at the Carlisle store include Kent Ruhl, David Roth, and Robert Rundell.

J. N. Mullan, Pharis sales research director, has been named supervisor of the three stores. Through them he will arrange and distribute window displays and other sales aids which will be available to all Pharis dealers and jobbers.

The Bearfoot Sole Co., Inc., has moved its Akron and Barberton factory operations and offices from P. O. Box 347, Akron, and 15th St. N. W. Barberton, to its new and modern factory at First and Water Sts., Wadsworth.

B. F. Goodrich Chemical Co., Rose Bldg., Cleveland, recently held a three-day sales conference with an inspection of the company's development and sales service laboratory in Cleveland, for members of the Hycar synthetic rubber and rubber chemicals division. Among those attending were: W. D. Parrish, technical service manager for Hycar; J. R. Hoover, vice president in charge of sales; J. H. Rines, staff representative, synthetic rubber and rubber chemicals; Howard E. Anderson, Chicago and central states sales representative for Hycar, rubber chemicals, and Philadelphia reclaimed rubber; Ray E. Bitter, West Coast representative for all products of the company; Dorn E. Sauser, sales service laboratory; B. S. Garvey, sales development; Roger C. Bascom, Northeastern representative for Hycar and rubber chemicals; Frank E. Bell, Midwest sales representative for Hycar and rubber chemicals—Eastern representative for Philadelphia reclaimed rubber; J. C. Richards, sales manager, Hycar and rubber chemicals; and Allyn I. Brandt, general sales manager.

Johnson Rubber Co., Middlefield, has elected as president Richard L. Kroesen, president of the Cleveland Sporting Goods Co., Cleveland.

NEW ENGLAND

Farrel Honors "Old Timers"

Seventy-six employes of Farrel-Birmingham Co., Inc., Ansonia, Conn., with company service records of 35 through 49 years were recently presented with engraved gold wrist-watches by Franklin Farrel, Jr., chairman of the finance committee. The occasion was the Ansonia and Derby "Old Timers" annual dinner, at which A. Austin Cheney, chairman of the board of directors, acted as toastmaster.

The Farrel-Birmingham "Old Timers" organization, which has three separate clubs within the company at different plant locations, takes its membership from employes with 25 or more years of continuous service. This affair, given for the Ansonia-Derby group, was attended by nearly all of the 226 members, including the dean of the company-wide organization, Edwin Van Riper, who has worked at Farrel-Birmingham for the past 67 years, and guests from the "Old Timers" clubs of the Buffalo and Stonington plants.

New Laboratory Established

Godfrey L. Cabot, Inc., manufacturer of raw materials for the rubber, paint, ink, and allied industries, 77 Franklin St., Boston, Mass., recently revealed that new plans have been put into effect to expand the technical and sales services of the company. Two key men, R. P. Rossman and George J. Duffy, have been transferred from the Cabot laboratories in Boston to Pampa, in the Texas Panhandle, where their talents will be more readily accessible for Cabot production and research. Cabot, moreover, has created a new laboratory in Texas for the sole purpose of working on the compounding and formulation problems of all the industries it serves. Mr. Duffy and Mr. Rossman will be in Texas to direct this research, at the spot where Cabot carbon black is made.

Mr. Rossman now heads the Texas Branch of the Cabot research and development department. Much of his time will be given to production control and the development of new blacks for use in rubber. In charge of the Cabot rubber research group since 1944, he had joined the Cabot staff of chemists in 1937. Mr. Rossman was given his B.S. in chemical engineering at the South Dakota State School of Mines and Technology in 1934 and received his master's in physical chemistry at the Massachusetts Institute of Technology in 1936.

Mr. Duffy was awarded his B.S. in chemistry at Tufts College in 1937. He has been with Cabot since 1940 and for six years directed much of the Cabot research and development of new products, both in the Boston laboratory and the plants in the Southwest. He was technical manager of special blacks in the company's research and development department at the time of his transfer to Texas.

In Pampa both men will work with W. L. Loving, head of Cabot research and development in the field.

The Cabot company last month released statistics showing how greatly this company has increased its production of carbon black during the first five months of 1946. Cabot manufactured more carbon black by the channel process in May, 1946, than in any other month of its history. Output of channel black by the Cabot plants during the first five months of 1946 was 40% higher than during the same period in 1945. The manufacture of furnace-type blacks for the same five months was 34% above that for last year. All of these increases were achieved over and above the wartime levels, when the production of carbon black by the entire industry reached the largest volume ever known.

CANADA

New Distribution Set-Up

Tires, tubes, and other products of the tire division of Dominion Rubber Co. Ltd., Montreal, P.Q., will be distributed in the western provinces by three major distributers; Saskatchewan, Bowman Bros., Ltd., with head office in Saskatoon; Alberta, Motor Car Supply Co. of Canada, Ltd., with head office in Calgary; and British Columbia, Mackenzie, White & Dunsmuir, Ltd., with head office in Vancouver.

Branches of Bowman Bros. in Saskatchewan are in Saskatoon, Regina, North Battleford, Yorkton, Prince Albert, Rosetown, Weyburn, Swift Current, and Moose Jaw. Those of Motor Car Supply are in Calgary, Edmonton, Lethbridge, and Cranbrook; while those of Mackenzie, White are in Vancouver, Victoria, Nanaimo, New Westminster, Nelson, Vernon, Penticton, Kamloops, and Trail.

R. J. Irvine has been appointed Dominion Rubber tire sales representative for Saskatchewan, and will make his headquarters at the offices of Bowman Bros. Representing Dominion Rubber's tire engineering and service department is Harold Rahn, who will also make his headquarters in Saskatoon, acting as tire consultant on all tire operational problems.

In Alberta, J. Maybin is Dominion Rubber tire sales representative, working in conjunction with Motor Car Supply Co. His headquarters will be at Dominion Rubber Co., Ltd. The technical consultant from Dominion Rubber's tire engineering and service department for this province will be L. G. Picard, with headquarters also at Dominion Rubber, Calgary.

Dominion Rubber tire sales representative for British Columbia continues to be W. J. S. Campbell, who will operate from Dominion Rubber Co., Ltd., Vancouver, B. C., working with Mackenzie, White.

Dominion Tire dealers in these pro-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vinces will in future tie in with these three distributers. More intensive coverage of these areas will result from this move in the West.

J. A. Lucas has been appointed general sales manager, R. D. Ratz, production manager, and J. W. Symons, factory manager, according to A. W. Hopton, vice president and general manager, tire division of Dominion Rubber. G. P. Davis succeeds Mr. Symons as divisional sales manager for Ontario, with headquarters at Toronto, and G. M. Stambaugh, formerly manager of tire service engineering, will be located at Toronto as supervisor of sales for the Provincial Tire Co.

Mr. Lucas, a graduate of McMaster University, held the positions of manager, standards department, and sales manager, tire division, as well as general manager, textile division, before his recent appointment. Mr. Ratz was technical superintendent, plant superintendent, and factory manager with the tire division before being named production manager.

Mr. Symons had also been manager of the division's tire engineering and service department and assistant factory superintendent. Mr. Davis had also served as operating manager at the company's Toronto branch for Provincial Tire.

Gutta Percha & Rubber Ltd., Toronto 3, Ont., according to President F. A. Warren, has elected J. Ross Belton a director and a vice president. Mr. Belton had been general manager of the company since 1943.

FINANCIAL

Dewey & Almy Chemical Co., Cambridge, Mass. Four months to April 30: net income, $188,111, equal to 50¢ each on 307,215 common shares; net sales, $3,725,345.

Firestone Fire & Rubber Co., Akron, O., and subsidiaries. Six months ended April 30, 1946: net profit, $12,845,926, equivalent to $6.09 a common share, contrasted with $10,481,806, or $4.88 a share, in the corresponding period of the preceding year.

Jenkins Bros., Bridgeport, Conn. For 1945: net income, $149,503, or 86¢ each on 125,404 common shares, against $456,055, or $3.30 a common share, in 1944.

Meyercord Co., Chicago, Ill. Six months to March 31: net income, $562,591, equal to $2.25 each on 249,523 common shares, against $546,886, or $2.19 a share, for the year ended September 30, 1945.

Pharis Tire & Rubber Co., Newark, O. Six months ended April 30, 1946: net profit, $536,721, equal to $2.53 a share, contrasted with $141,013, or 66¢ a share, for the corresponding period a year ago; net sales, $8,946,374, against $6,594,688.

A. G. Spalding & Bros., Inc., New York, N. Y. Six months to April 30: net income, $465,000, equal to 89¢ a share, against $335,000, or 64¢ a share, in the corresponding period a year ago.

OBITUARY

Charles E. Cummings

CHARLES E. CUMMINGS, assistant secretary of Raybestos-Manhattan, Inc., Passaic, N. J., and one of the 52-year Pioneers of the Manhattan Rubber Division, died June 6. Born in Brooklyn, N. Y., June 27, 1867, Mr. Cummings first entered the rubber industry in 1881, when he became employed by the New York Belting & Packing Co. He joined Manhattan Rubber as a bookkeeper on April 16, 1894. He was also a director and secretary of The Manhattan Securities Co.

Mr. Cummings was a member of the Royal Arcanum and a representative on the order's supreme national council and a life long member of the First Methodist Church of Passaic.

Fred O. Williams

FRED OSCAR WILLIAMS, former president of the Seamless Rubber Co., New Haven, Conn., died June 15 from a cerebral hemorrhage.

Born in Louisiana, Mo., December 16, 1877, Mr. Williams received his education there and entered the employ of Kelly & Williams, wholesale druggist sundry company, Kansas City, Mo., where he remained until 1909. He then became sales manager of the Faultless Rubber Co., Ashland, O., remaining until 1912. He joined the rubber department of the United Drug Co., Boston, Mass., which later purchased the Seamless Rubber Co., of which Mr. Williams was president from 1917 until 1934. He retired from active business in 1941 because of ill health.

Mr. Williams was a member of the Boston and New York Athletic clubs, numerous gun clubs and the Masons.

Funeral services and burial took place June 20 in Louisiana, Mo.

He leaves a widow.

CALENDAR

Aug. 16-17.	**Los Angeles Rubber Group, Inc. Fishing Trip. Coronado Islands.**
Sept. 9-13.	**American Chemical Society, Chicago, Ill.**
Sept. 10-14.	**Chemical Show. Coliseum, Chicago, Ill.**
Sept. 14-17.	**National Association of Waste Material Dealers, Inc. Fall Convention. Palace Hotel, San Francisco, Calif.**
Sept. 21.	**Connecticut Rubber Group. Outing.**
Oct. 1.	**Los Angeles Rubber Group, Inc. Mayfair Hotel, Los Angeles, Calif.**
Oct. 7-11.	**National Safety Congress and Exposition. Chicago, Ill.**
Oct. 18.	**Detroit Rubber & Plastics Group, Inc. Detroit Leland Hotel, Detroit, Mich.**
Nov. 12.	**Los Angeles Rubber Group, Inc.**
Dec. 2-6.	**American Society of Mechanical Engineers. Annual Meeting. New York, N. Y.**
Dec. 3.	**Los Angeles Rubber Group, Inc. Mayfair Hotel, Los Angeles, Calif.**
Dec. 15.	**Detroit Rubber & Plastics Group, Inc. Detroit Leland Hotel, Detroit, Mich.**

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Dewey & Almy Chemical Co.	$4.25 Pfd.	1.06¼ q.	July 20	July 1
Endicott Johnson Corp.	Com.	0.25	July 1	June 17
Firestone Tire & Rubber Co.	Com.	0.75 incr.	July 20	July 5
Garlock Packing Co.	Com. (new)	0.25 init.	June 29	June 20
General Tire & Rubber Co.	4½% Pfd.	1.06¼ q.	June 28	June 18
General Tire & Rubber Co.	2nd Pfd.	0.27 4/5 init.	June 28	June 21
General Tire & Rubber Co.	3¾% Pfd.	0.32½ q.	June 28	June 21
General Tire & Rubber Co.	3¼% Pfd.	0.27 2/25 q.	June 28	June 21
Jenkins Bros.	Fdrs.	0.25 q.	June 28	June 14
Jenkins Bros.	Pfd.	1.00 q.	June 28	June 14
Jenkins Bros.	Com.	1.75 q.	June 28	June 14
Midwest Rubber Reclaiming Co.	Pfd.	0.56¼ q. init.	July 1	June 20
Norwalk Tire & Rubber Co.	Com.	0.25	Aug. 30	Aug. 15
Pharis Tire & Rubber Co.	Com.	0.25 incr.	July 10	July 1

Patents and Trade Marks

APPLICATION

United States

2,397,080. **For Applying Adhesives, a Rigid Wooden Stem Covered with a Rubber Boot Having a Flexible Fin at the End.** F. B. Baker, Chicago, Ill.

2,397,105. **Endless Track Mechanism for Track-Laying-Type Vehicles Including an Endless Chain Made up of Inside and Outside Links, with Elastic Rings therebetween.** J. M. Hait, San Gabriel, assignor to Food Machinery Corp., San Jose, both of Calif.

2,397,124. **Molded, Resilient, Rubber-Composition Bearing.** M. R. Buffington, Milburn, and E. G. Jegger, Montclair, both in N. J.

2,397,180. **Vibration Dampening Fitting Including a Deformable Ring.** J. N. Wolfram, assignor to Parker Appliance Co., both of Cleveland, O.

2,397,184. **Fuel Container Including a Flexible Bag of Complemental Sections.** A. J. Klose, Inglewood, Calif., assignor by mesne assignments to Consolidated Vultee Aircraft Corp., a corporation of Del.

2,397,219. **Timing Relay Including a Body of Resinous Cold-Flowing Thermoplastic Material.** W. R. Taliaferro, Edgewood, assignor to Westinghouse Electric Corp., East Pittsburgh, Pa.

2,397,232. **Flexible Therapeutic Applicator Including a Unit with Tube-Like Passages for a Refrigerant, the said Unit Has a Waterproof Coating.** E. L. Barnes and Herman A. Brenner, both of Buffalo, N. Y.

2,397,242. **A Light Polarizing Device Including a Light-Polarizing Surface Consisting of an Extremely Thin Film of Molecularly Oriented Plastic Material, Protected from Impact by a Layer of Resilient, Impact-Resisting, Light-Transmitting Plastic Material; the Last Layer Is Protected from Abrasion by a Layer of Hard, Light-Transmitting Plastic Material.** L. W. Chubb, Jr., Sharon, and C. J. T. Young, Cambridge, both in Mass., assignors to Polaroid Corp., Dover, Del.

2,397,248. **In an Accumulator, a Rigid Container in Which Is Disposed a Bladder of Molded Flexible Material.** N. de Kiss, North Hollywood, Calif., assignor, by mesne assignments, to Bendix Aviation Corp., South Bend, Ind.

2,397,257. **Surgical Suction Apparatus.** P. P. Goland and C. R. Drew, both of Washington, D. C., assignors of two-fifths to P. P. Goland, two-fifths to C. R. Drew, and one-fifth to A. D. Kessler.

2,397,269. **In a Composite Valve, a Valve Body Carrying a Yieldable Elastic Member.** J. W. Kelly, La Canada, Calif., assignor to Adel Precision Products Corp., a corporation of Calif.

2,397,313. **Driving Belt.** E. F. Gingras, Buffalo, N. Y.

2,397,334. **Insert for Rubber Valve Stems.** L. C. Broecker, Nichols, assignor to Bridgeport Brass Co., Bridgeport, both in Conn.

2,397,360. **Cover Assembly for a Wheel Structure.** G. A. Lyon, Allenhurst, N. J.

2,397,413. **In a Shoe Construction, a Relatively Thick Resilient Cellular Sole Arranged Between an Inner and an Outer Sole.** W. A. Evans, Melfort, Sask., Canada.

2,397,460. **Article Having Adjacent Elastic Parts Joined Together by a Composite Thread Including an Elastic Core Strand, an Inelastic Core Strand, and an Extensible and Retractible Covering Encasing and Binding the Core.** A. R. Bell, assignor of 25% to W. J. Horn and 25% to F. S. Horn, all of Philadelphia, and 25% to A. J. Miller, Bala-Cynwyd, Pa.

2,397,568. **Shockproof Electrical Resistor Having an Exterior Sheath of Polymerized Tetrafluorethylene.** E. F. Seaman, Washington, D. C.

2,397,576. **Detachable Coupling for Handling the Flow of Liquid therethrough, Including a Pair of Coupling Boxes, a Valve Cooperating with Them, and Resilient Sealing Means therebetween.** A. Townhill, assignor to Thompson Products, Inc., both of Cleveland, O.

2,397,608. **In a Former for Sheet Metal Parts, a Rigid Rotatable, Rubber-Covered Matrix.** C. M. Johnson, Freeport, N. Y.

2,397,641. **Panty Brief with Elastic Portions.** D. Blair, Chicago, Ill.

2,397,709-710. **Aviator's Belt, or the Like, Including an Inflatable Bladder Disposed at the Inner Surface of the Front Section.** I. R. Versoy, New Haven, and L. H. Loeffel, West Haven, assignors by mesne assignments, to Berger Bros. Co., New Haven, both in Conn.

2,397,744. **As a New Article of Manufacture, a Base Having a Coating of Butyl Methacrylate Polymer Containing Dispersed therein Finely Divided Metallic Silver.** F. Kertesz, Great Kills, S. I., N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,397,751. **Baby Pants Including a Body Portion Made of a Film of Vinyl Resin.** Le R. H. Rand, assignor to Rand Rubber Co., both of Brooklyn, N. Y.

2,397,796. **In an Accumulator, a Rigid Container Having Disposed therein a cup of Molded Flexible Material.** W. A. Lippincott, Evanston, assignor to Ideal Roller & Mfg. Co., Chicago, both in Ill.

2,397,801. **Snap-Fastener Including a Pair of Narrow Strips of Elastic Synthetic Waterproof Non-Corrodible Plastic Material.** A. R. Mitchell, Dedham, Mass.

2,397,847. **Fluid Seal.** H. M. Dodge, Wabash, Ind., assignor to General Tire & Rubber Co., Akron, O.

2,397,936. **Synthetic Lumber Composed of Vegetable Fibers in a Heat-Set Resin.** A. A. Glidden, Watertown, and W. R. Hickler, Winthrop, both in Mass., assignors to B. F. Goodrich Co., New York, N. Y.

2,398,013. **Cable Grip.** W. D. Kyle, assignor to Line Material Co., both of Milwaukee, Wis.

2,398,076. **Aviation Mask.** A. H. Bulbulian, Rochester, Minn.

2,398,224. **Abrasive Disk Having a Protective Coat of Heat-Hardened Phenol-Aldehyde Condensation Resin.** R. W. Hackett, East Braintree, assignor to Abrasive Products, Inc., South Braintree, both in Mass.

2,398,241. **In a Brush, a Relatively Thick Layer of Rubber Bonded to the Outer Surface of the Detachable, Bristle Anchorage Member.** R. N. Miller, Rosemont, and W. H. Grindell, Narberth, assignors to Pennsylvania Railroad Co., Philadelphia, all in Pa.

2,398,246. **Hair Protecting-Bathing Cap.** M. Rasmussen, Sioux City, Iowa.

2,398,261. **Flexible Shaft Coupling.** S. A. Stone, assignor to Deister Concentrator Co., both of Fort Wayne, Ind.

2,398,359. **In a Shielded Spark-Plug Connector, Insulations of Plastic Material Molded in Place.** W. R. Curtiss, assignor by mesne assignments, to Great American Industries, Inc., both of Meriden, Conn.

2,398,399. **In a Pipe Joint, a Resilient Gasket.** M. E. Alexander, West Orange, N. J.

2,398,467. **Atomizer.** J. B. Schmitt and A. J. Attinger, assignors to De Vilbiss Co., all of Toledo, O.

2,398,506. **In a Light Polarizer, a Thin Dichroic Layer of a Linear, Hydrophilic High Polymeric Plastic Material.** H. G. Rogers, Brookline, Mass., assignor to Polaroid Corp., Dover, Del.

2,398,509. **Self-Inking Rubber Stamp.** J. L. Weisenthal, Bronx, N. Y.

2,398,518. **Pessary.** G. A. Clark, Elwood, Nebr.

2,398,531. **Filling Mechanism for Fountain Pens.** P. C. Hull, assignor to Parker Pen Co., both of Janesville, Wis.

2,398,533. **Atomizer Head Adapted to Be Applied to a Container.** F. O'L. Killorin, Watertown, and D. L. Spender, assignors to Scovill Mfg. Co., both of Waterbury, both in Conn.

2,398,718. **Completely Non-Metallic Percussion Fuse.** O. Rasmussen, Dayton, O., assignor to General Motors Corp., Detroit, Mich.

2,398,744-745. **Inflatable Kite Balloon.** D. C. Jalbert, Belmont, assignor to Dewey & Almy Chemical Co., North Cambridge, both in Mass.

2,398,783. **Rubber Sleeve in a Rotary Seal.** W. Gilbert, Sr., Johnstown, assignor to Syntron Co., Homer City, both in Pa.

2,398,823. **Erasing Machine.** C. B. Fisher, Glen Ellyn, Ill.

2,398,828. **In an Underground Fuel Storage System, a Flexible, Rubber-Like Fuel Containing Cell.** R. B. Gray, Dundalk, assignor to Glenn L. Martin Co., Middle River, Md.

2,399,086. **For use in Stitchdown Shoes, a Welt of Resilient, Waterproof Synthetic Plastic Material.** W. C. Wright, Brookfield, N. H., assignor to Wright-Batchelder Corp., Boston, Mass.

2,399,103. **In a Bonded Pipe and Socket Joint between Members Having Linings, a Ring of Thermosetting Plastic at the Juncture of the Lining Ends.** W. O. Clinedinst, Mt. Lebanon, Pa., assignor to National Tube Co., a corporation of N. J.

2,399,157. **In a Cable, Filler Elements of Polymerized Vinylidene Chloride in the Spaces between the Inner and the Outer Metal Elements of a Strand.** R. F. Warren, Jr., Stratford, Conn.

Dominion of Canada

434,261. **Power Transmission Belting Having Transverse Corrugations Retained in Its Assembled Form by a Plurality of Separate Fasteners.** H. Brammer, Leeds, York, England.

434,279. **In a Wheel Structure, an Annular Trim Member Made from Resiliently Flexible Synthetic Plastic Material.** G. A. Lyon, Allenhurst, N. J., U.S.A.

434,326. **Shaped Body Composed of a Synthetic Linear Polyamide.** Canadian Industries, Ltd., Montreal, P.Q., assignee of W. H. Markwood, Jr., Wilmington, Del., U.S.A.

434,335. **Gasket Composed of Polytetrafluoroethylene.** Canadian Industries, Ltd., Montreal, P.Q., assignee of R. M. Joyce, Jr., Marshallton, Del., U.S.A.

434,487. **Resilient Mounting, Including Rubber Bushings, for the Handlebars of Vehicles.** Indian Motorcycle Co., Springfield, assignee of S. DuPont, Wilbraham, both in Mass., U.S.A.

434,490. **In a Machine Tool Collet Including Angularly Spaced Rigid Gripping Members Disposed about an Axis, a Body of Resilient Material Interconnecting These Members.** Jacobs Mfg. Co., Hartford, assignee of A. M. Stoner, West Hartford, both in Conn., U.S.A.

434,516. **Reinforced Rubber Sealing Ring.** Tecalemit, Ltd., Brentford, Middlesex, assignee of C. C. S. Le Clair, London, England.

434,525. **Endless Track for Tractors, Tanks, etc.** Wingfoot Corp., assignee of H. F. Keck, both of Akron, O., U.S.A.

434,548. **In Securing a Rivet to a Material, the Use of a Jointing Composition of Synthetic Resin or Rubber.** A. Kremer, London, England.

434,630. **Springs of Rubber-Like Material in a Motor Support.** Transit Research Corp., assignee of E. H. Piron, both of New York, N. Y., U.S.A.

434,643. **In a Force Transmitting Means Including Supporting Means with a Sealing Bore, a Pliable Elastic Sealing Plug Transversely Filling at Least a Portion of the Bore.** S. Vernet, Yellow Springs, O., U.S.A.

434,665. **In a Wheel Structure, a Cover Member of a Synthetic Plastic Material.** G. A. Lyon, Allenhurst, N. J., U.S.A.

434,730. **In a Process of Producing a Silk Screen or the Like Stencil, the Use of a Layer of a Heat-Softening Polyvinyl Resin.** Johnson, Matthey & Co., Ltd., assignee of E. R. Box, and F. E. Kerridge, all of London, England.

United Kingdom

576,410. **Drums for Ball and Pebble Mills, etc.** Wilkinson Rubber Linatex, Ltd., and F. McIntyre.

576,411. **Electric Cables.** British Insulated Cables, Ltd., J. L. Miller, J. Conning, and H. R. F. Carsten.

576,417. **Tractor and Tank Tracks.** Wingfoot Corp.

576,418. **Resin Bonded Composite Ply Products.** B. F. Goodrich Co.

576,424. **Vibration and Shock Absorber.** A. V. A., Ltd., and T. H. Pentony.

576,526. **Cycle Pedals.** L. Camillis.

576,585. **Electric Cables.** Pirelli - General Cable Works, Ltd., J. J. Wright, and H. C. R. Corbridge.

576,631. **Electrically Semi-Conducting Members.** Westinghouse Electric International Co.

576,643. **Treads of Pneumatic Tires.** United States Rubber Co.

576,647. **Filamentous Structure of Synthetic Linear Fiber-Forming Polymers.** Imperial Chemical Industries, Ltd.

576,748. **Endless Track for Vehicles.** G. O. Jones.

576,767. **Wheel Brake Apparatus.** Dunlop Rubber Co., Ltd., and H. J. Butler.

576,847. **Endless Track Landing Elements and Means for Mounting Them on Aircraft.** G. H. Dowty.

576,904. **Brake and Like Apparatus.** Dunlop Rubber Co., Ltd., and H. J. Butler.

PROCESS

United States

2,397,231. **Coated Light Polarizers.** C. E. Barnes, Acton, Mass., assignor to Polaroid Corp., Dover, Del.

2,397,838. **Elastic Fabric Having the Appearance and Feel of Non-Elastic Fabric.** M. A. Chavannes, Genthod, Switzerland, assignor to American Ecla Corp., Dover, Del.

2,398,108. **Spraying Metal on to the Surface of a Base Material.** E. S. Mott, assignor to Wingfoot Corp., both of Akron, O.

2,398,698. **Inserts for Rubber Valve Stems.** J. C. Crowley, Cleveland Heights, assignor to Dill Mfg. Co., Cleveland, both in O.

2,398,876. **Forming a Tube of Organic Plastic Material.** J. Bailey, West Hartford, assignor to Plax Corp., Hartford, both in Conn.

2,398,890. **Reinforced Abrasive Articles.** E. E. Howard, Buffalo, N. Y., assignor to Carborundum Co., Niagara Falls, N. Y.

Dominion of Canada

434,270. **Laminated Thermosetting Sheet Material.** D. Gonda, London, England.

434,329. **Extruding Articles in the Form of Films, Filaments, Tapes, etc., from Normally Solid Ethylene Polymers.** Canadian Industries, Ltd., Montreal, P.Q., assignee of E. L. Martin, Wilmington, Del., U.S.A.

434,439. **Vulcanized Blown Rubber Article.** H. Ratlovich, Detroit, Mich., U.S.A.

434,638. **Conductors with Helix Insulators Extending Longitudinally Thereof.** L. H. Morin and D. Marinsky, assignee of one-half the interest, both of New York, N. Y., U.S.A.

434,727-729. **Making Articles of Rubber-Like Material by Direct Deposition in the Desired Shape of Solids of an Aqueous Dispersion of a Copolymer of Butadiene and a Monovinyl Compound.** International Latex Processes, Ltd., London, England, assignee of C. R. Peaker, Union City, Conn., U.S.A.

434,731. **Manufacturing Elastic Bags by the Dipping Process.** Lorica Laboratories, Inc., Jersey City, N. J., assignee of R. E. Thompson, Nyack, N. Y., both in the U.S.A.

434,772. **Fibrous Mat of Thermoplastic Cellulose Derivative Fibers.** Sylvania Industrial Corp., Fredericksburg, Va., assignee of C. S. Francis, Jr., Chestnut Hill, Pa., both in the U.S.A.

434,773. **Making a Paper Product from an Aqueous Suspension of Paper-Making Fibers and Synthetic Resin Fibers.** Sylvania Industrial Corp., Fredericksburg, Va., assignee of C. S. Francis, Jr., West Harwich, Mass., both in the U.S.A.

434,774. **Making a Shaped Felt Structure from a Mass of Fibers Including Thermoplastic Fibers.** Sylvania Industrial Corp., Fredericksburg, Va., assignee of C. S. Francis, West Harwich, Mass., both in the U.S.A.

434,795. **Molding Plastic Material.** W. B. Hoey, Franklin, Mich., and E. D. McCurdy, Cleveland, trustees and assignees of C. D. Shaw, Macedonia, both in O., both in the U.S.A.

United Kingdom

576,511. **Electric Cables.** Shardlow Electric Wires, Ltd., and F. G. Hargreaves.

576,551. **Flexible Tubing.** Tenaplas, Ltd., and C. G. Lemon.

576,812. **Rubber Articles from Latex.** Latex Industries, Ltd., and L. Landau.

CHEMICAL

United States

2,397,093. **Coating Composition, Including a Solution of Polystyrene, a Wax, Another Thermoplastic Resin, and, as Plasticizer, the Distillate Obtained by Distilling Polymerized Alpha-Methyl-Para-Methyl Styrene.** C. Dreyfus, New York, N. Y., and B. Anderson, Maplewood, N. J., assignors to Celanese Corp. of America, a corporation of Del.

2,397,143. **Impression Material Including a Water-Soluble Alginate, a Filler and Barium Bromate.** H. v. B. Joy, Montclair, N. J., assignor to Montclair Research Corp., a corporation of N. J.

2,397,144. **Impression Material Including a Water-Soluble Alginate, and a Setting Agent therefor Selected from the Group of Calcium and Strontium Sulphide.** E. J. Molnar, Toledo, O.

2,397,145. **Impression Material Including a Water-Soluble Alginate, a Filler and an Alkaline-Earth Chromate Hardening Agent.** H. v. B. Joy, Montclair, N. J., and E. J. Molnar, Toledo, O.

2,397,146. **Polymerizing Butadiene and Acrylonitrile with the Aid of a Water Solution of Friedel-Crafts Catalyst Containing an Emulsifying Agent.** H. B. Kellog, Union City, and W. J. Sparks, Elizabeth, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,397,194. **Liquid Thermosetting Resin Adhesive Including the Resinous Condensation Product of Aqueous Formaldehyde, Urea, and Aqueous Ammonia.** G. H. Miller, Portland, Oreg.

2,397,201. **Acceleration of the Polymerization of Butadiene-1,3 Hydrocarbons with the Aid of an Aged, Aqueous Solution Containing a Water-Soluble Persulfate and a Water-Soluble Ferricyanide.** E. S. Pfau, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,397,205. **Resinous Product Obtained by Reacting an Acyclic Terpene Hydrocarbon Having Three Double Bonds per Molecule with an Aldehyde from the Group of Formaldehyde and Tri-Oxymethylene, in the Presence of a Catalyst from the Group of an Inorganic Acid, an Unsubstituted Organic Carboxylic Acid of between One and Six Carbon Atoms, and an Organic Sulfonic Acid.** A. L. Rummelsburg, assignor to Hercules Powder Co., both of Wilmington, Del.

2,397,240. **Ester Resin Including the Reaction Product of a Cyclopentadiene Adduct of Maleic Anhydride with a Polyhydric Alcohol, and a Reactant from the Group of Fatty Acids of Drying and Semi-Drying Oils, Their Monoglycerides and Their Oxidized Tri-Glycerides.** W. H. Butler, Bloomfield, N. J., assignor to Bakelite Corp., New York, N. Y.

2,397,260. **Polymerization of Ethylene and Vinylidene Chloride in the Presence of a Peroxy Compound Catalyst.** W. E. Hanford, Wilmington, and J. R. Roland, McDaniel Heights, assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,397,287. **As a New Composition, Triethoxy Silicol Methacrylate.** B. E. Ostberg, Arlington, assignor to Polaroid Corp., Cambridge, both in Mass.

2,397,320. **Plastic, Non-Inflammable Composition, Including Ethyl Cellulose, a Plasticizer and a Water-Insoluble Heavy Metal Oxalate.** W. W. Koch, assignor to Hercules Powder Co., both of Wilmington, Del.

2,397,323. **Synthetic Resin Produced by Digesting a Natural Furfural-Yielding Material with Steam in the Presence of Acid to Liberate Furfural and Other Volatile Substances in the Vapor Phase, and Reacting on that Furfural and Other Vapors with Phenol Vapor in an Alkaline Environment.** J. J. Trefz, Evanston, and L. S. Shoberg, Glenview, assignors to J. F. Trefz, Evanston, both in Ill., as trustee.

2,397,338. **Producing Filaments, Films, and the Like from a Solution of Viscose Containing an Ethylene Oxide Polymer.** H. Cowling, Chester, Pa., assignor to American Viscose Corp., Wilmington, Del.

2,397,340. **Subjecting a Sheet of Polyvinyl Alcohol to the Action of a Bath Including an Acetalization Catalyst and Isopropyl-Formal, to Produce Hollow Articles.** J. Dahle, West Newton, assignor, by mesne assignments, to Pro-phy-lac-tic Brush Co., Northampton, both in Mass.

2,397,355. **Reaction Product of Isophorone, Alkali Metal Hydroxide, and Sulfur.** O. Huppert, Newark, N. J.

2,397,372. **Vulcanizable Composition Including a Polymeric, Conjugated Diene Elastomer, and a Monomeric Ester of a Beta Furylacrylic Acid.** H. S. Rothrock and W. H. Wood, assignors to E. I. du Pont de Nemours &Co., Inc., all of Wilmington, Del.

2,397,396. **Preparing Guanamines by Heating an Acyl Dicyandiamide with Cyanamide in the Presence of Water.** P. Adams, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,397,399. **Vulcanizing Polychloroprene Synthetic Rubber with the Aid of an Additional Compound of a Halide of an Element of the Group of Aluminum, Antimony, Boron, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Nickel, Tin, and Zinc, and a Nitrogenous Organic Base Which Does not Contain a Nitrogen-to-Nitrogen Linkage.** W. Baird, B. J. Habgood, D. A. Harper, and J. A. Hendry, Blackley, Manchester, England, assignors to Imperial Chemical Industries, Ltd., a corporation of Great Britain.

2,397,409. **Vulcanizing Rubber and Rubber-Like Materials in the Presence of Sulfur and an Accelerator Including the Stable Chemical Complex Obtained by Fusing One Mol Part of a Diarylguanidine-Zinc Chloride Adduct with One to 12 Mol Parts of Para-Formaldehyde and from One to 12 Mol Parts of a Substance from the Group of Mercaptobenzothiazole, Benzothiazole Disulfide and Mercaptothiazoline.** A. R. Davis, Riverside, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,397,430. **Producing a Rutile Pigment from Hydrated Titanium Oxide.** D. B. Pall, assignor, by mesne assignments, to American Cyanamid Co., both of New York, N. Y.

2,397,437. **Formaldehyde - Cellulose Compound.** J. B. Rust, West Orange, and W. H. Van Delden, Cedar Grove, N. J., assignors to Montclair Research Corp., a corporation of N. J.

2,397,548. **Resinous Condensation Product Prepared by Partially Deesterifying in the Presence of an Acid Deesterification Catalyst and a Carbonyl Compound, a Copolymer of a Mono-Vinyl Ester of a Saturated Monocarboxylic Acid with a Mono-2-Chloroallyl Ester of a Saturated Monocarboxylic Acid.** W. O. Kenyon, and W. F. Fowler, Jr., assignors to Eastman Kodak Co., all of Rochester, N. Y.

2,397,580. **Selectively Separating Cyclopentadiene from a Mixture Containing Cyclopentadiene, Isoprene, and Piperylene.** A. L. Ward, Drexel Hill, Pa., assignor to United Gas Improvement Co., a corporation of Pa.

2,397,592. **Insulation Composition for Conductors Including a Copolymer of Vinyl Chloride and Vinyl Acetate and a Plasticizer Consisting of Approximately Equal Parts of Hydrogenated Methyl Abietate and a Mixture of Acetylated Castor Oil, Butoxy Ethyl Stearate and Butyl Acetyl Ricinoleate.** A. O. Blades, Rome, assignor to General Cable Corp., New York, both in N. Y.

2,397,600-601. **Preparing a Resinous Product from a Mixture of Polymers of Cyclopentadiene and Unsaturated Glyceride Oil.** H. L. Gerhart, Milwaukee, Wis., and L. M. Adams, Corpus Christi, Tex., assignors to Pittsburgh Plate Glass Co., a corporation of Pa.

2,397,612. **In the Manufacture of Safety Glass, an Interlayer Consisting of a Plasticized Flexible Sheet of Polyvinyl Acetal.** W. H. Lycan, Milwaukee, Wis., assignor to Pittsburgh Plate Glass Co., Pittsburgh, Pa.

2,397,627. **For Adhesively Bonding Rubber to Other Surfaces, a Composition Including a Rubber Derivative Obtained by Depolymerizing Dissolved Raw Rubber, a Partially Reacted Soluble Phenol-Aldehyde Resin, and a Hardening Agent for the Partially Reacted Resin.** O. H. Smith, West Englewood, N. J., assignor to United States Rubber Co., New York, N. Y.

2,397,724. **Resinous Materials Obtained by Copolymerizing a Monomeric Mixture of Vinyl Chloride and Trichlorethylene.** O. W. Cass, Niagara Falls, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,397,727. **Synthetic Compositions from Liquid Organo-Siloxanes.** W. H. Daudt, assignor to Corning Glass Works, both of Corning, N. Y.

2,397,774. **Removable Pressure-Sensitive Adhesive Masking Sheet for Service under High-Temperature Conditions Which Includes a Backing and a Coating Including a Rubber, a Coumarone-Indene Type of Tackifying Resin and a Vulcanizing Agent.** D. J. Buckley, Baton Rouge, La., assignor to Industrial Tape Corp., North Brunswick Township, N. J.

2,397,866. **Photographic Element Including a Support on which Is at least One Water-Permeable Layer Composed of Hydrolyzed Interpolymer of an Aliphatic, Terminally Unsaturated Monoolefin of Two to Four Carbon Atoms, and a Vinyl Ester.** D. M. McQueen, Newark, assignor of E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,397,891. **Monomeric Acrylic Acid Obtained by Passing Molecular Oxygen into an Anhydrous Solution of Acrolein in an Organic Water-Miscible Solvent Containing Dissolved Vanadic Acid.** K. H. W. Tuerck, Banstead, England, assignor to Distillers Co., Ltd., Edinburgh, Scotland.

2,397,895. **New Synthetic Compositions Obtained by Intercondensing a Partially Condensed Methyl Siloxane with Trimethylethoxysilane in the Presence of Water.** E. L. Warrick, Pittsburgh, Pa., assignor to Corning Glass Works, Corning, N. Y.

2,397,942. **Paste Including Polymerized Vinyl Halide, an Aromatic Triester of Phosphoric Acid, a Glycol Ether Phthalate and a Hard Thermoplastic Polymer Other Than Polyvinyl Halide.** E. F. Brookman and L. M. Smith, both of Welwyn Garden City, England, assignors to Imperial Chemical Industries Ltd., a corporation of Great Britain.

2,397,996. **Improved Process of Extracting Butadiene from a Mixture of Saturated and Unsaturated Hydrocarbons, with Ammoniacal Cuprous Acetate Solution.** S. W. Wilson, Baton Rouge, La., assignor to Standard Oil Development Co., a corporation of Del.

2,398,080. **Nitrating Hexamethylenetetramine.** G. V. Caesar, Staten Island, and M. Goldfrank, assignors to Stein, Hall & Co., Inc., both of New York, both in N. Y.

2,398,102. **Coagulating Latex by Adding an Equimolecular Mixture of Chloral Hydrate and an Alkali Metal Cyanide.** J. K. Lockridge, Inglewood, Calif., assignor to Wingfoot Corp., Akron, O.

2,398,103. **Producing Diene Hydrocarbons by Pyrolyzing an Acylated 1-Alken-4-ol at a Temperature between 500 and 600° C. to Remove a Molecule of Carboxylic Acid and Then Separating the Hydrocarbon from the Acid.** J. R. Long, assignor to Wingfoot Corp., both of Akron, O.

2,398,105. **Emulsion Polymerization of Butadienes in the Presence of a Paraffin Complex Sulphur Regulator.** G. P. Mack, Jackson Heights, assignor to Advance Solvents & Chemical Corp., New York, both in N. Y.

2,398,154. **Vulcanizing Zinc-Free Rubber by Treating It with a Sulfur-Containing Bath of a Hydrocarbon-Di-Substituted Dithiocarbamate of a Metal Whose Oxide Is an Accelerator Activator and a Hydrocarbon - Disubstituted Ammonium Salt of a Hydrocarbon-Disubstituted Dithiocarbomate, and Then Vulcanizing the Impregnated Rubber.** R. R. Olin, Akron, and H. J. Cramer, Cuyahoga Falls, both in O.

2,398,307. **Protein-Acetone Resin.** F. A. Hessel, Upper Montclair, and J. B. Rust, Verona, both in N. J., assignors to Ellis-Foster Co., a corporation of N. J.

2,398,321. **Rubbery Polymerization Product of Butadiene-1,3 and Benzal Malononitrile.** D. T. Mowry, Dayton, O., assignor to Monsanto Chemical Co., a corporation of Del.

2,398,331. **Heat-Curable Composition Including a Water-Soluble Polyhydric Phenol, a Water-Soluble Hard Acetone - Formaldehyde Resin, and, as Curing Catalyst, an Ammonium Salt of a Strong Acid.** J. B. Rust, West Orange,

and F. A. Hessel, Montclair, both in N. J., assignors to Montclair Research Corp., a corporation of N. J.

2,398,344. **Stable Aqueous Emulsion of Polyvinyl Acetate.** H. M. Collins and M. Kiar, both of Shawinigan Falls, assignors to Shawinigan Chemicals, Ltd., West Montreal, both in P. Q., Canada.

2,398,350. **Milling Hydrated Lime into an Alkyl Acrylate Polymer, Molding the Mixture, and Then Heating, to Produce an Alkyl Acrylate Polymer Having Elastic Properties Similar to Those of Vulcanized Rubber.** F. C. Atwood, Newton, and H. A. Hill, Cambridge, both in Mass., assignors, by mesne assignments, to National Dairy Products Corp., New York, N. Y.

2,398,388. **Making a Laminated Stock from Fibrous Laminae Impregnated with the Resinous Reaction Product of a Mixture of a Resorcin and Formaldehyde in the Presence of a Mild Alkaline Catalyst Having a Buffering Action.** A. J. Norton, Wells, Me., assignor to Pennsylvania Coal Products Co., Petrolia, Pa.

2,398,468. **Treating Substantially Pure Liquid Butadiene to Prevent Polymerization on Transportation or Storage over an Extended Period of Time.** W. A. Schulze and G. H. Short, both of Bartlesville, Okla., assignors to Phillips Petroleum Co., a corporation of Del.

2,398,479-480. **Addition Compounds of the Class of Halogenated Mercaptans and Halogenated Thioethers.** W. E. Vaughan and F. F. Rust, Berkeley, assignors to Shell Development Co., San Francisco, both in Calif.

2,398,483. **Mono-Fluoro-Dichloro-Styrene.** V. Weinmayer, Pitman, N. J., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,398,575. **Alpha, Alpha-Bis-(Beta'-Halogenalkyl)-Aryl-Acetonitriles.** F. Bergel, N. C. Hindley, A. L. Morrison, and H. Rinderknechts, assignors to Roche Products, Ltd., all of Welwyn Garden City, England.

2,398,613. **Purification of Latices of Rubber, Balata, Gutta Percha, Etc. by Treating Such a Latex with a Dilute Caustic Alkali at Elevated Temperatures to Cause Precipitation of Heavy Impurities therein, Separating a Small Fraction Containing the Impurities, and Then Dialyzing the So-Purified Latex to Purify It Further.** H. R. Braak, Batavia Centrum, Java, assignor, by mesne assignments, to P. Honig, Washington, D. C., Commissioner of the Board for Economic and Financial Affairs of the Netherlands Indies, Surinam, and Curacoa, as trustee.

2,398,685. **Acyclic Monoketones from a Normal Butylene.** H. L. Yale and G. W. Hearne, Berkeley, assignors to Shell Development Co., San Francisco, both in Calif.

2,398,689. **Azeotropic Styrene Distillation.** W. J. Bloomer, Westfield, N. J., assignor to Lummus Co., New York, N. Y.

2,398,735. **Sealing Tape Including Sheet Material Coated with a Thermoplastic Adhesive Composition Including an Asphalt Blended with an Unmilled Reaction Product of Rubber and a Halogen Acid of Tin.** L. Davis and E. C. Tuukkanen, both of Worcester, assignors to McLaurin-Jones Co., Brookfield, both in Mass.

2,398,736. **Solid Thermoplastic Copolymer of Styrene and a Nuclear Halogenated Styrene Having not More than Two Halogen Atoms in the Molecule.** R. R. Dreisbach, assignor to Dow Chemical Co., both of Midland, Mich.

2,398,757. **An (Alkoxymethoxy) Acetonitrile Having the Formula $ROCH_2OCH_2CN$.** D. J. Loder and W. M. Bruner, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,398,803. **Chlorinated Polythenes Containing 60 to 75% by Weight of Chlorine, Which Are Soluble in Cold Carbon Tetrachloride and Have a Tensile Strength over 400 Kilogram per Square Centimeter at 20° C.** J. R. Myles and F. S. B. Jones, Northwich, England, assignors to Imperial Chemical Industries, Ltd., a corporation of Great Britain.

2,398,837. **Production of Butyl Alcohol and Acetone from Uninverted Molasses Mash.** E. F. McCoy, assignor to Wisconsin Alumni Research Foundation, both of Madison, Wis.

2,398,882. **Thermoplastic Composition from the Class of Polystyrene Resins, Methyl Methacrylate Resins, and Celluose Esters Plasticized with a Mixture of Alkyl Halophthalates.** C. C. Clark, Kenmore, assignor to Mathieson Alkali Works, Inc., New York, both in N. Y.

2,398,926. **Catalytic Polymerization of Monoolefinic Organic Compounds.** G. L. Dorough, Niagara Falls, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,398,930. **Separating Butadiene from Mixtures of Butadiene and More Saturated Hydrocarbons.** W. W. Gary, assignor to Filtrol Corp., both of Los Angeles, Calif.

2,398,973. **Refining Isoprene Contaminated with Impurity from the Group of Acetylenic Material and Aldehydes.** F. J. Soday, Swarthmore, Pa., assignor to United Gas Improvement Co., a corporation of Pa.

2,398,976. **Rubbery Polymerization Product from an Aqueous Emulsion of an Olefin, Benzene, a Diolefin of the Formula $CH_2{=}CH{-}\underset{X}{\underset{|}{C}}{=}CH_2$ Where X Is of the Group of Hydrogen and an Alkyl Radical, and an Aliphatic Olefin from the Group of Butylene and an Amylene, Polymerized in the Presence of an Oxygen Yielding Peroxide Catalyst.** C. A. Thomas, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,398,998. **Softening and Plasticizing a Polymeric Organic Sulfide Obtained by the Reaction of an Alkaline Polysulfide and an Aliphatic Dihalide Having the Halogan on Separate Carbon Atoms.** E. S. Blake, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,399,019. **Adhering Rubber to the Surface of a Metal Which Has the Property of Forming a Dark-Colored Metal Sulfide.** H. W. Grinter, Cuyahoga Falls, and M. E. Gross, Akron, both in O., assignors to B. F. Goodrich Co., New York, N. Y.

2,399,049. **Producing 1,3-Butadiene by Dehydration of 1,3-Butylene Glycol.** T. H. Manninen, Stamford, Conn., assignor to U. S. Industrial Chemical, Inc., New York, N. Y.

2,399,053. **Heat Resinifying Furfuryl Alcohol in the Presence of a Chlorinated Tricresyl Phosphate Containing Chlorinated Methyl Groups as a Resinification Catalyst.** B. W. Nordlander, Schenectady, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,399,156. **Purifying Raw Resinous Rubber from the Group of Guayule and Dandelion.** P. Stamberger, Philadelphia, R. K. Eskew, Glenside, and R. S. Hanslick, Philadelphia, all in Pa., assignors to the United States of America, as represented by the Secretary of Agriculture.

Dominion of Canada

434,325. **Preparing an Alkyl Ester by Reacting a Cyclic Formal with Carbon Monoxide in the Presence of an Acidic Catalyst.** Canadian Industries, Ltd., Montreal, P. Q., assignee of W. F. Gresham, Wilmington, Del., U.S.A.

434,327. **Treating a Polymer of Ethylene with at Least One Vinyloxy Compound to Produce Alpha, Omega-Dicarboxylic Acids.** Canadian Industries, Ltd., Montreal, P. Q., assignee of W. E. Hanford, Wilmington, Del., U.S.A.

434,328. **Coating Composition Including an Alkyd Resin Modified with a Vegetable Oil Having Drying Properties and an Anti-Fogging Agent from the Group of Uncombined Thiourea and Diphenyl Thiourea.** Canadian Industries, Ltd., Montreal, P. Q., assignee of R. C. Wood, Philadelphia, and H. R. Young, Aldan, both in Pa., U.S.A.

434,332. **A Methyl Methacrylate Syrup Adapted for Forming Cast Sheets between Two Glass Plates Separated by a Compressible Gasket.** Canadian Industries, Ltd., Montreal, P. Q., assignee of B. M. Marks, Newark, N. J., U.S.A.

434,333. **Preparation of an Alkyl Ester of Methacrylic Acid from a Mixture of Acetone Cyanhydrin Oleum and an Aliphatic Alcohol in the Presence of a Polymerization Inhibitor.** Canadian Industries, Ltd., Montreal, P. Q., assignee of H. R. Dittmar, Wilmington, Del., U.S.A.

434,337. **Manufacturer of Vinyl and Ethylidene Esters by Reacting Acetylene with a Carboxylic Acid in the Presence of a Small Amount of Cacodyl Oxide.** Canadian Industries, Ltd., Montreal, P. Q., assignee of F. O'N. Cockerille, Waynesboro, Va., U.S.A.

434,398. **An Adherent Insulating Composition for Electrical Conductors Including an Inorganic Filler Bonded with a Silicic Acid Sol Produced by Combining Ethyl Silicate, Normal Hydrochloric Acid and Ethylene Glycol Monobutyl Ether.** Western Electric Co., Inc., assignee of Bell Telephone Laboratories, Inc., both of New York, N. Y., assignee of C. J. Christensen, Summit, N. J., both in U.S.A.

434,461. **Diazine Derivative.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of G. F. D'Alelio and J. W. Underwood, both of Pittsfield, Mass., U.S.A.

434,467. **Damping Fluid Including a Liquid Polymeric Organo-Siloxane.** Corning Glass Works, Corning, N. Y., assignee of R. R. McGregor, Verona, and E. L. Warrick, Pittsburgh, both in Pa., both in the U.S.A.

434,508. **Furniture Finish Including Chlorinated Rubber, a Lesser Proportion of Polymerized Vinyl Acetate and a Plasticizer from the Group of Chlorinated Paraffin and a Liquid Long Oil Non-Drying Oil Modified Alkyd Resin.** Raolin Corp., New York, N. Y., assignee of J. W. Raynolds, Easton, Pa., both in the U.S.A.

434,528. **Treating Yarn of Regenerated Cellulose with an Aqueous Composition Including Polymerized Ethlylene Oxides, a Wetting Agent, and a Substance from the Group of Polymerized Methacrylic Acid and Derivatives thereof.** C. Dreyfus, New York, N. Y., assignee of G. W. Seymour and D. Y. Miller, both of Cumberland, Md., U.S.A.

434,567. **Aminotriazines.** American Cyanamid Co., New York, N. Y., assignee of J. M. Grim, Stamford, Conn., U.S.A.

434,645. **Producing Adhesives from Condensation Products of a Member of the Group of Urea and Thiourea with Formaldehyde.** I. G. Farbenindustrie, A.G., Frankfurt-a.M., assignee of H. Scheuermann, Ludwigshafen-on-Rhine-Oggersheim, both in Germany.

434,689. **Heavy-Duty Friction Element for use on Vehicular Brakes Composed of a Mass of Friction Material, Inert Filler, and a Friction-Modifying Agent Bonded with the Heat Reaction Product of a Mixture of Butadiene-1,3 Acrylonitrile Copolymer, Sulfur, Accelerator, and a Heat-Resistant Phenolic-Aldehyde Resin.** American Brake Shoe Co., New York, N. Y., assignee of E. C. Keller, Detroit, and R. E. Spokes, Ann Arbor, both in Mich., both in the U.S.A.

434,718. **Coating Composition Including a Solvent, a Cellulose and a High-Melting Synthetic Resin.** Hercules Powder Co., Wilmington, assignee of I. C. Clare, Elmhurst, both in Del., U.S.A.

434,741-744. **Zinc Resinate.** Newport Industries, Inc., assignee of R. C. Palmer and E. Edelstein, all of Pensacola, Fla., U.S.A.

434,745-748. **Primary Aromatic Amine Aldehyde Resin.** Norton Co., Worcester, assignee of L. Coes, Jr., Brookfield, both in Mass., U.S.A.

434,801. **Vulcanizing a Rubber in the Presence of a Metal Dithiocarbamate.** H. I. Cramer, Philadelphia, Pa., U.S.A.

United Kingdom

576,384. **Resinous Lacquers or Enamels.** British Insulated Cable, Ltd., and J. F. Cowan.

576,394. **Layers of Organic Polysulfide Polymer Plastics.** International Latex Processes, Ltd.

576,397. **Vinyl Esters.** H. F. Oxley, E. B. Thomas, and W. G. B. Mills.

576,416. **Styrene and the Like.** H. Steiner and S. Whincup.

576,427. **Aldehydronitriles.** E. I. du Pont de Nemours & Co., Inc.

576,553. **Production of Hydrogenated Furans or Mixtures of Hydrogenated Furans.** Revertex, Ltd., C. L. Wilson, and W. H. Bagnall.

576,562. **Resinous Condensation Products, More Especially Useful for the After-Treatment of Dyeing.** J. R. Geigy, AG.

576,594. **Thermosetting Plastics.** Wingfoot Corp.

576,665. **Synthetic Rubber Dispersions.** Wingfoot Corp.

576,716. **New Organic Silicon Compounds.** P. J. Garner and Imperial Chemical Industries, Ltd.

576,744. **Chlorinated Rubber and Other Chlorinated-Rubber-Like Materials and Chlorinated Rubber Hydrochloride.** E. P. Newton. (Hercules Powder Co.)

576,745. **Resinous Compositions.** Bakelite, Ltd.

576,793. **Dyeing Synthetic Polymers.** W. E. F. Gates and Imperial Chemical Industries, Ltd.

576,800. **Formal and Hemiformal of Ethylene Cyanohydrin.** E. I. du Pont de Nemours & Co., Inc.

576,830. **Interpolymerization of Ethylene and Vinylidene Chloride.** E. I. du Pont de Nemours & Co., Inc.

576,880-882. **Aromatic Amine-Aldehyde Resinous Products.** Norton Grinding Wheel Co., Ltd.

576,913. **Derivatives of Hydrolyzed Interpolymers of Ethylene and Vinyl Organic Esters.** E. I. du Pont de Nemours & Co., Inc., and W. H. Sharkey.

576,938. **New Organic Silicon Compounds.** P. J. Garner and Imperial Chemical Industries, Ltd.

576,944. **Resinous Polymerization Products.** British Thomson-Houston Co., Ltd.

576,962. **Piperidine Derivatives.** G. M. Badger, H. C. Carrington, J. A. Hendry, and Imperial Chemical Industries, Ltd.

MACHINERY

United States

2,397,404. **Vulcanizing Device.** F. R. Britt, Rising Fawn, Ga.

2,397,838. **Apparatus for Producing Elastic Fabrics.** M. A. Chavannes, Genthod, Switzerland, assignor to American Ecla Corp., Dover, Del.

2,397,863. **Tire Spreader.** A. E. Jennings, Central City, Ky.

2,398,151. **Separate Section Abutment Ring Mold Component for Tire Recapping Apparatus.** J. W. Napier, assignor to C. O. Dennis, both of Macon, Ga.

2,398,163. **Apparatus for Preparing Rubber-Treated Upholstery Hair Pads.** A. M. Smith, La Grange, R. W. Smith, Chicago, and A. H.

Zeigler, Evanston, assignors to Armour & Co., Chicago, all in Ill.

2,398,318. **Apparatus for Injection Molding of Plastics.** H. F. MacMillin, W. Ernst, and G. A. Waldie, all of Mt. Gilead, O., assignors to Hydraulic Development Corp., Inc., Wilmington, Del.

2,398,876. **Apparatus for Forming Tubes of Organic Material.** J. Bailey, West Hartford, assignor to Plax Corp., Hartford, both in Conn.

2,398,929. **Tube Cutter.** D. A. Forsberg, Madison, Wis.

2,399,117. **Apparatus for Molding Plastic Material.** H. J. Hart, Baldwin Township, Pa.

UNCLASSIFIED

United States

2,397,168. **Mold for the Injection Molding of Plastics.** E. G. Touceda, United States Navy.

2,397,277. **Traction Device for Wheels with a Tire Mounted thereon.** W. B. Lawrence, St. John's, Newfoundland.

2,397,278. **Fastener for Use on an Elastic Band of a Hose Supporter.** S. W. Leming, Cincinnati, O.

2,397,741. **Tire Shield.** J. A. Jordan, Jr., Camp Short, Ala.

2,398,472. **Device for Securing Tires to the Rims of Vehicle Wheels.** M. L. Shuler, Cleveland Heights, O.

2,398,787. **Apparatus for Treating Yarn to Increase Its Tensile Strength.** A. W. Hansen, Bayside, N. Y., and A. N. Benson, DesMoines, Iowa, assignors to United States Rubber Co., New York, N. Y.

2,398,979. **Cable Stripping Tool.** C. S. Vaughan, Jr., Tuscumbia, Ala.

2,399,146. **Tire Tool.** J. E. Schumann, Fresno, Calif.

Dominion of Canada

434,391. **Hose and Pipe Coupling.** Tecalemit, Ltd., Brentford, Middlesex, assignee of C. C. S. Le Clair, London, both in England.

434,597. **Wheel and Brake for Airplanes.** General Tire & Rubber Co., assignee of H. T. Kraft, both of Akron, O., U.S.A.

434,653. **Tire Mounting Apparatus.** P. Croteau, Montreal, P.Q., Canada.

United Kingdom

576,543. **Metal Hose Clips.** P. E. Milleret and Hunt & Turner, Ltd.

576,547. **Pipe and Tube Couplings.** W. and J. W. Raylor.

576,561. **Rudder for Inflatable Dinghies.** R. F. D. Co., Ltd., and A. Van B. Bik.

576,573. **Cable or Conduit Joints.** F. C. Turner.

576,679. **Providing Plastic Articles with Metallic Coverings.** L. Rado.

576,681. **Couplings for Pipes, Tubes, and the Like.** Thompson Products, Inc.

576,772. **Flexible Pipe Joints or Couplings.** R. C. S. James and Hunter & Turner, Ltd.

576,862-863. **Tube or Pipe Couplings.** J. J. V. Armstrong (Parker Appliance Co.)

576,867. **Pipe Couplings.** D. W. Main.

576,896. **Curing Cheddar Cheese.** Wingfoot Corp.

TRADE MARKS

United States

420,096. **Physical Culture.** Footwear. Selby Shoe Co., Portsmouth, O.

420,098. **Plastolein.** Plasticizing oils and plasticizers. Emery Industries, Inc., Cincinnati, O.

420,117. **Double Eagle.** Bicycles. Goodyear Tire & Rubber Co., Akron, O.

420,143. **Ramses.** Prophylactic rubber and membranous articles. Julius Schmid, Inc., New York, N. Y.

420,148. **Pliocel.** Airplane fuel tanks. Goodyear Tire & Rubber Co., Akron, O.

420,157. **Slipper-Slide.** Footwear. R. B. Hardman, Los Angeles, Calif.

420,168. Representation of a segment of a face, including the mouth, between the words: **"Beaute-Tone, Sam Amenta."** Acrylic material for dentures. S. Amenta, doing business as Sam Amenta Specialties, Chicago, Ill.

420,169. **Seal-Peel.** Plastic materials for temporary protective coating on articles during shipping and storage. Seal-Peel, Inc., New York, N. Y.

420,217. **Du-All.** Cleaning compound for rubber. E. B. Livingston, doing business as Edw. Livingston & Sons, Kansas City, Mo.

420,221. **Trans-Adhesive.** Transparent adhesive-backed paper. Monsen-Chicago, Chicago, Ill.

420,254. **"Metalweld."** Abrasive coated cloth or paper. Behr-Manning Corp., Troy, N. Y.

420,256. **Naugatex.** Antioxidants, accelerators, sulphur paste, zinc oxide, thickeners, anti-frosting agent and stabilizers. United States Rubber Co., New York, N. Y.

420,265. Representation of a label with a drawing of a girl, and the word, **"Perkies."** Short panties with elastic leg. Kingsboro Silk Mills, Inc., Daisy, Tenn.

420,272. **Bayflex.** Abrasive and grinding wheels. Bay State Abrasive Products Co., Westboro, Mass.

420,341. Representation of a mountain with the words: **"Charles Chester"** on it. Footwear. Charles Chester Shoe Co., Brockton, Mass.

420,347. **Hartley's.** Combs, narrow elastic fabrics, etc., Hartley's, Inc., Miami, Fla.

420,387. **Autopoint.** Erasers, fountain pens. Autopoint Co., Chicago, Ill.

420,389. **Enduro.** Balls for various sports. W. J. Voit Rubber Corp., Los Angeles, Calif.

420,390. **Med-O-Seal.** Extruded resinoid plastic tubes, rods, strips, and monofilament threads. Irvington Varnish & Insulator Co., Irvington, N. J.

420,401. **Sani-Cap.** Uterus caps. H. L. Aron, Los Angeles, Calif.

420,407. Representation of a label with the bottom part black and above the word: **"Flexite"** written on it. Thermoplastic film. J. L. Haber & Co., New York, N. Y.

420,416. Representation of a winged foot separating the word: **"Goodyear".** Airplane fuel tanks. Goodyear Tire & Rubber Co., Akron, O.

420,423. **TS.** Power transmission belts. Gates Rubber Co., Denver, Colo.

420,431. **Aqua Sheen.** Resin-base water paint. B. F. Goodrich Co., New York, N. Y.

420,433. Representation of a label with a picture of a Scotty dog standing at the end of a strip of tweed fabric, and the words: **"Real Mac Taggart Sportswear."** Wearing apparel including raincoats. MacTaggart Sportswear Co. A. N., New York, N. Y.

420,445. **Marlboro.** Fountain pens and mechanical pencils. David Kahn, Inc., North Bergen, N. J.

420,460. **Aquastop.** Coated fabrics. Protective Coatings Corp., Belleville, N. J.

420,519. **Tiny Tights.** Baby pants. Coated Sundries, Inc., New York N. Y.

420,523. **Youthform.** Brassières, panties, girdles, and pantie girdles. Youthform Co., Atlanta, Ga.

420,530. **Short Gals!** Footwear. Shoecraft, Inc., New York, N. Y.

420,573. **Neolyn.** Synthetic resin. Hercules Powder Co., Wilmington, Del.

Fixed Government Prices*

	Price per Pound: Civilian Use	Price per Pound: Other Than Civilian Use
Guayule		
Guayule (*carload lots*)	$0.17½	$0.31
Latex		
Normal (*tank car lots*)	.26	.43½
Creamed (*tank car lots*)	.26¾	.44¼
Centrifuged (*tank car lots*)	.27¾	.45¼
Heat-Concentrated (*carload drums*)	.29½	.47
Plantation Grades		
No. 1X Ribbed Smoked Sheets	.22½	.40
1X Thin Pale Latex Crepe	.22½	.40
2 Thick Pale Latex Crepe	.22	.39½
1X Brown Crepe	.21⅜	.38⅞
2X Brown Crepe	.21⅛	.38⅝
2 Remilled Blankets (Amber)	.21¼	.38¾
3 Remilled Blankets (Amber)	.21⅛	.38⅝
Rolled Brown	.18	.35½
Synthetic Rubber		
GR-M (Neoprene GN)	.27½	.45
GR-S (Buna S)	.18½	.36
GR-I (Butyl)	.15½	.33
Wild Rubber		
Upriver Coarse (crude)	.12⅝	.26⅛
(washed and dried)	.20¼	.37¾
Islands Fine (crude)	.14⅝	.28¼
(washed and dried)	.22½	.40
Caucho Ball (crude)	.11⅝	.24¾
(washed and dried)	.19½	.37
Mangabiera (crude)	.08½	.19¾
(washed and dried)	.18	.35½

* For a complete list of all grades of all rubbers see Rubber Reserve Co. Circular 17, p. 169, May, 1943, issue.

Rims Approved and Branded By the Tire & Rim Association, Inc.

Rim Size	May, 1946
15" & 16" D. C. Passenger	
16x4.00E	220,504
16x4.50E	276,694
15x5.00E	57,615
16x5.00F	1,326
15x5.50F	43,904
16x5.50F	57,640
16x4.00E-Hump	224,960
16x4.50E-Hump	6,621
15x4.50E-Hump	50,070
15x5.00F-Hump	21,413
15x5.50F-Hump	8,874
16x5-K	127,440
16x6-L	49,726
17" & Over Passenger	
18x2.15B	5,842
17x3.62F	461
18x3.62F	2,696
Flat Base Truck	
20x3.75P	1,347
17x4.33R	449
20x4.33R	59,009
20x5.00R	16,757
15x5.00S	1,161
18x5.00S	1,971
20x5.00S	133,750
22x5.00S	1,315
20x6.00S	7,541
20x6.00T	3,115
24x6.00T	599
15x7.33V	413
20x7.0	5,981
20x7.33V	45,231
22x7.33V	6,734
24x7.33V	31
20x8.37V	387
24x8.37V	737
Semi D.C. Truck	
16x4.50E	7,820
15x5.50F	4,358
16x5.50F	4,465
16x6.50H	13,625
Tractor & Implement	
12x3.00D	6,975
15x3.00D	29,042
16x3.00D	10,374
36x3.00D	233
20x4.50E	12,139
18x5.50F	823
20x5.50F	2,072
24x6.00S	5,284
36x6.00S	985
W8-16	193
W8-24	3,853
W8-28	740
W8-32	4,692
W8-36	3,126
W8-38	449
W8-40	255
W9-36	3,759
W9-38	2,024
W10-36	2,586
DW8-24	1,567
DW8-38	653
DW9-38	7,381
DW10-38	10,702
DW11-24	1,836
DW11-28	1,173
DW11-30	451
DW11-32	293
DW11-36	569
DW11-38	1,262
Earth Mover	
24x15.00	251
TOTAL	1,588,330

Foreign Trade Opportunities

The firms and individuals listed below have recently expressed their interest in buying in the United States or in United States representations. Additional information concerning each import or export opportunity, including a World Trade Directory Report, is available to qualified United States firms and may be obtained upon inquiry from the Commercial Intelligence Unit of the United States Department of Commerce, or through its field offices, for $1 each. Interested United States companies should correspond directly with the concerns listed concerning any projected business arrangements.

(*Continued on page 592*)

New Machines and Appliances

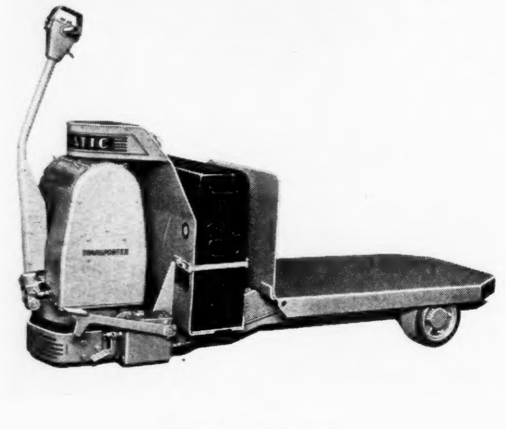
Metal Thermometer

New Dillon Stainless Steel Thermometer

THE new Dillon stainless steel thermometer, designed for all industry, is said to have a 1% accuracy over the entire scale, and the accuracy is unaffected by overloads up to 50% above the 500° F. range and 10% above the 750° F. range. Built for durability, the thermometer has an all-metal welded structure. The stem and the mounting nut are of 18-8 stainless steel, resistant to all but a few acids. The mounting nut is welded to the stem for most pressure uses. The end plug, also of stainless steel, is welded to the stem. The mounting nut has a standard ½-inch pipe thread. The stem has a diameter of ¼-inch and may be ordered from stock in either five- or nine-inch lengths, with the length figured from the tip of the stem to the top thread on the mounting nut. Special length stems are available on order.

The dial is made of anodized aluminum and is available in either three- or five-inch standard sizes. The heat-resistant dial has white figures on a black background that will remain bright and legible indefinitely. The highest grade crystal plate glass is used, and Lucite crystal is available where breakage is a possibility. The pointer is permanently fixed to the shaft for lifetime accuracy; the shaft is fixed directly to the coil. The design employs no gears, assuring greatest accuracy and long life. The dial is sealed with a gasket against which the head bezel fits tightly.

In use, the stem is immersed two inches into liquids and four inches into gases. For use where extremely high pressures are encountered, or where it is necessary to remove the thermometer from time to time, special wells are available upon request. Although furnished with Fahrenheit scales, Centigrade dials will be available on order. The three-inch diameter dial thermometer has a total weight of 8½ ounces; while the five-inch model weighs 14 ounces. W. C. Dillon & Co., Inc.



Postwar Transporter

Improved Electric Propelled Hand Truck

THE Automatic Transportation Co., manufacturer of the Transporter, has announced new improved models of this electric propelled hand truck. Featuring more than a score of major improvements, the new Transporter is claimed to have a potential service life double that of its predecessor, and maintenance costs are expected to be halved.

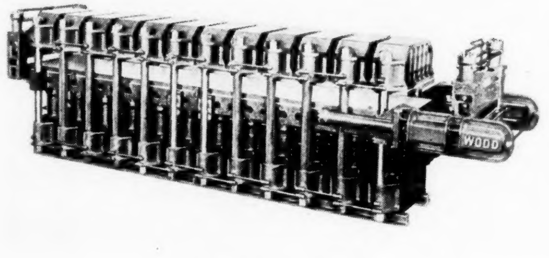
A revolutionary new hydraulic lift pump which reduces by two thirds the time necessary to get a Transporter load into moving position, and a redesigned brake four to five times as powerful as that on the old model are outstanding new features. The new lift pump reduces by nearly 80% the number of strokes formerly required to engage the load and requires 25% less effort to lift. One stroke is all that is required to engage a loaded skid with standard one-inch clearance. The pump's performance is achieved by combination of low-pressure (high-speed) cylinder for raising the platform into contact with the skid or pallet, and a high-pressure (low-speed) cylinder for raising the load. As soon as the platform encounters the load resistance, the fluid from the low-pressure cylinder bypasses back into the reservoir, and the high-pressure cylinder raises the load. Another advantage of the new pump is that it is interchangeable with the old and can be installed on all Transporters now in service.

The new brake is applied automatically by release of the guide handle and will bring a fully loaded Transporter to an immediate stop even on grades up to 10%, the maximum commonly encountered by material handling equipment. The most efficient power plant yet designed for self-propelled hand trucks, the Transporter's heavy-duty industrial truck-type series wound DC motor has been redesigned to make it even more compact and efficient. Improvements include improved brush holders, redesigned commutator cover and relocated leads, all of which provide easier access and simplified maintenance of the motor.

Structural changes include a complete redesign of the driving unit to provide greater durability of working parts and freer access for maintenance. Principal modifications include a new magnetic contactor with silver alloy tips that do not "build up" or "crater"; new commutator-type collector rings equipped with carbon brushes eliminating the need of lubrication; simplified controller with reduced number of contacts; larger and stronger double-pitch reduction chains; strengthened countershaft; larger countershaft bearing to compensate for larger brake; and simplified wiring. Besides these modifications other improvements include relocation of the resistor to permit access to the motor; increase in diameter of the turntable; addition of a heavy pressed-steel chain guard; addition of a heavy steel front bumper; extension of thumb guard on the steering handle; change to double-pitch chain sprockets; and reduction in number of lubrication points. The new Transporter is being made in four models: 4,000- and 6,000-pound capacity platform types for skid platforms; 4,000-pound capacity fork type for pallet loads; and a special 3,000-pound capacity fork model for tin plate.

The Transtractor, the company's new push-pull unit, uses the Transporter power unit and incorporates all the improvements of the new model Transporter.

Standard equipment includes a battery capable of at least eight hours' operation. A portable cabinet plug-in charging unit is available.



Wood Hydraulic Belt Press

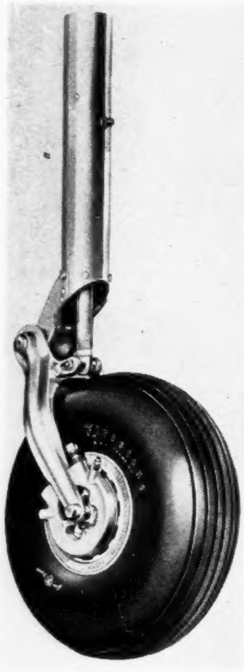
Multiple-Cylinder Belting Vulcanizer

THE R. D. Wood Co., Philadelphia, Pa., has announced a multiple-cylinder hydraulic press designed for vulcanizing rubber belting. The 3,180-ton press can be operated at pressures up to 2,250 p.s.i. The 24 cylinders are arranged in pairs, complete with piping, to make up 12 two-cylinder units. With this arrangement any pair of cylinders can be cut out at any time. All units are completely interchangeable and can be removed from the press without dismantling any other part.

The two 63½- by 30- by 3¾-inch heating platens are machined parallel within 0.003-inch and given a high-grade emery and oil finish. The platens have four parallel steam circuits to provide the necessary heating uniformity. The press is equipped with hydraulic stretcher and clamping units mounted at the ends of the moving platen to maintain tension on the belt while it is being processed. This equipment provides both clamping and stretching force of 60 tons ultimate. The maximum stretching stroke is 3½ feet. Similar belt curing presses in any practical plate size and capacity can also be built upon request.

"M.S.A. Industrial Gas Masks." Mine Safety Appliances Co., Pittsburgh, Pa. 4 pages. This illustrated bulletin describes the company's gas masks for protection against industrial gases or combinations of gases, smokes, vapors, and dusts. The different gas masks available are shown together with the selection of canisters for use with them, and a list of gases against which protection is afforded.

New Goods and Specialties



New Firestone SuperFlex Undercarriage for Aircraft

Package-Unit Undercarriage for Aircraft

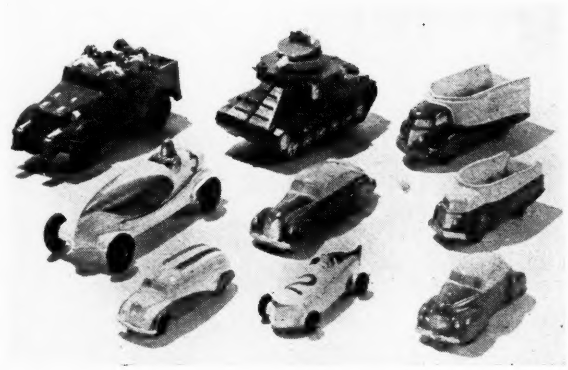
THE Firestone Aircraft Co. is introducing its new package-unit SuperFlex Undercarriage to the aviation industry. The undercarriage, with a lightweight, efficient, and troublefree shock absorption unit, is being made available for all aircraft weighing less than 3,000 pounds. The patented shock absorption unit operates as follows. A spring-like rubber cylinder filled with compressed air, cushions the initial impact of landing. Rings of friction material then act as brakes in restricting any bouncing tendencies. The landing gear has no telescoping tubes, no oil valves or compartments, no packing glands. Dust and dirt are claimed to have no effect on the operation of the unit. The simplicity of the SuperFlex Undercarriage and its extreme lightness have enabled aircraft manufacturers to save weight not only in the undercarriage, but also in the fuselage and wing structures that support the landing gear assembly. The unit meets all CAA requirements for overloaded landing impacts; it cannot stick or jam during compression or extension; it has a minimum drag surface; it is the lightest-weight unit of its kind; and it is fabricated by modern methods so as to sell at a very low cost. The unit, which includes landing gear, tire, wheel, and brake, can be installed easily and replaced quickly. Made in three sizes, it can fit practically any airplane under 3,000 pounds in weight. The same SuperFlex principle is being applied to larger and larger aircraft.

All-Rubber Industrial Wheel

A NEW all rubber industrial wheel has been added to Goodrich's line, supplementing the company's Vulcanized-on tires to metal wheels. The new wheel is constructed with a metal bearing sleeve molded integrally in a hard rubber core in which ball bearings for a choice of axle diameters are mounted. The company's exclusive "low power" E-Z rolling tread rubber compound is vulcanized to the hard rubber core. Carrying capacity ratings for all-rubber wheels are equal to those for Vulcanized-on tires and metal wheels of the same size, but resistance to extreme impact loads is less because hard rubber shatters more readily than cast iron. They are therefore not recommended where extremely rough usage is encountered. In services where agents corrosive to metal wheels or detrimental to the rubber to metal bond cause early failure of the rubber-metal wheels, the new all-rubber wheel is especially recommended. The B. F. Goodrich Co., Akron, O.

New Molded Rubber Toys

NINE new rubber wheel toys designed to entertain and educate children have been announced by the Sun Rubber Co. The brilliantly colored, molded rubber toys are made of the same synthetic rubber used in bullet-sealing gas tanks and include a medium tank, an army scoutcar, a master truck,



Sunruco Molded Rubber Wheel Toys

a super racer, a deluxe teardrop sedan, a truck racer, a passenger bus, coupe, and sedan. According to T. W. Smith, company general manager and past-president of the American Toy Manufacturers' Association, the toys are colored with harmless, fast dyes and are equipped with solid, one-piece nickeled steel axles. Smooth steel hub caps insure greater safety for the child, in addition to keeping the rubber wheels firmly in place.

The huge pent-up demand for Sunruco rubber toys cannot be satisfied at present because of material shortages, especially in the steel used for axles and hubs, and the shortage of skilled workers. The company has therefore instituted an allocation system whereby merchandise is distributed to old customers on the basis of past purchases, and new customers are handled as production allows.

Improved Paper Fiber Rugs

PAPER fiber rugs with improved resistance to water, wear, skidding, mildew, and fading were forecast by Monsanto Chemical Co., St. Louis, Mo. The improved properties are brought about by the coating of paper twine with vinyl butyral plastic, and the rug then woven on standard mill equipment. These rugs should be relatively immune to stains from ink, gravy, food, or other sources, and it will be possible to clean them with a damp cloth. For decorative effects weavers can rely not only on the relatively fugitive colors in the base paper, but also on pigments permanently embedded in the plastic; and design possibilities therefore appear to be unlimited. The process by which the paper twine is coated with the plastic has been established by technologists of the Worcester Plastic Coating Co., Worcester, Mass., which is now producing the coated twine in limited quantities. Because the coating equipment is just emerging from the pilot-plant stage, some time will elapse before the material becomes generally available to rug manufacturers. If and when application costs are reduced through mass production, Monsanto predicted that the paper rugs are likely to find wide use in patios, sun porches, summer cottages, and other informal locations, dining rooms where children spill food on the floor, on rear floorboards of automobiles, in handbags, shopping bags, shoe uppers, auto seat covers, and furniture slip covers.

"Tire Wear and Cost on Selected Roadway Surfaces." R. A. Moyer and Glen L. Tesdall. Iowa Engineering Experiment Station Bulletin 161. Iowa State College Bulletin, Vol. XLIV, No. 9, August 1, 1945. Iowa State College of Agriculture & Mechanic Arts, Ames, Iowa. 127 pages. This bulletin presents the results of an extensive research study of the factors which determine tire wear and cost and shows the means by which tire life can be extended through proper tire care and maintenance. Results show tire wear to be influenced directly by 15 factors, the most important being car speed, roadway surface, and driving and maintenance habits of the operator, and that 12 factors, most of which are avoidable, contribute directly to tire carcass failure.

EUROPE

GREAT BRITAIN

Future Bright for Rubber Manufacturers

Following the tradition of British learned societies, the council of the Institution of the Rubber Industry has established Annual Foundation Lectures to provide a regular opportunity for members and friends to hear prominent personalities with established reputation in their special fields in the rubber industry. It is intended to hold the lectures in Birmingham, London, and Manchester in rotation.

The first lecture was given on May 10 in Birmingham, by A. Healey, director of production, Dunlop Rubber Co., Ltd., who was adviser on the use of synthetic rubber to Rubber Control from 1942 to 1945. Mr. Healey, known for his work on resilience and allied properties of rubber compounds and his classic paper on "The Tire as Part of the Suspension System," is a Fellow of the Institution and received the 1943 Colwyn Gold Medal.

During his Foundation Lecture he discussed with great optimism "The Future of the Rubber Manufacturing Industry," briefly reviewing the British rubber industry at the outbreak of the war, and then analyzing the position of the main rubber products and their prospects. He showed that in 1939, before the commencement of hostilities, the British rubber industry directly employed about 80,000 persons and produced goods valued at approximately £60,000,000. Then taking the major branches of the industry in turn, he began with tires, pointing out how for decades tires had consumed more rubber than other products combined until 1939, when the percentage of rubber used for tire manufacture began to decline owing to the expansion of other products. However during the war 65% of total rubber still went into tires, and they still largely determine the future of the rubber industry. If road transport increased to the extent expected, he went on, the tire industry alone might soon be using 1,000,000 tons of rubber annually. He showed that though there have been changes in design and compounding, pneumatic tires today are essentially the same as in 1888. All alternatives so far have failed.

With regard to belting, the advantages of rubber here insured that these goods would continue to be made of rubber and that in fact the demand for rubber for this purpose would increase. He considered the future bright for specialty footwear and cheap rubber shoes for "backward" countries, and also for sponge rubber upholstery. The biggest development in the use of rubber in the years between the first and second world wars was that of sponge rubber upholstery, and Mr. Healey looked for such an increased demand here that consumption might equal 40,000 tons dry weight of rubber a year in the next few years. Despite new developments, he saw no reduction in the demand for rubber for such purposes as hot water bottles, sports balls, and garden hose, and the speaker predicted a big future for rubber in vibration insulations, especially for heavy machinery. The new materials, he stated later in the lecture, have helped broaden the scope of the industry so that in time the word "rubber" would include whole families of elastic substances.

The extension of knowledge of molecular physics and chemistry must benefit the industry also, he suggested, in the matter of rubber compounding. In his conclusion Mr. Healey estimated that the quantity of rubber available to the industry would reach about 2,500,000 tons of one kind and another in two years' time; consumption in 1946 would be about 1,300,000 tons.

Conference on "Industry and Research"

The Federation of British Industries held a two-day conference on "Industry and Research" in London on March 27 and 28, when the various aspects of the relation of research to industry were presented in several papers, which were duly discussed. Sir Clive Baillieu, president of the Federation and chairman of the first morning session, in his address emphasized the vital national importance in the postwar international business world of the ability and the will to apply the results of science to expand old industries and create new

ones. The British National Slogan, he said should be not merely "Britain Delivers the Goods," but also "Britain Creates the Goods." The papers read included: "Research and Production Costs," by A. Healey, director of production, Dunlop Rubber Co., Ltd.; "The Firm with a Research Department," P. Dunsheath, president of the Institute of Electrical Engineers and director and chief engineer of W. T. Henley's Telegraph Works, Ltd.; "Research and Quality," J. R. Hosking, director of research and development, paints division, Imperial Chemical Industries, Ltd.

At the annual meeting of the Federation on April 17, Sir Clive was unanimously reelected president. He was at the time in the United States on a short business visit, and Sir F. Bain, deputy president, took the chair in his absence.

Rubber Growers' Association Reports

The ordinary general meeting of the Rubber Growers' Association was held on April 25 in London, when the chairman, T. B. Barlow, reviewed the situation of the Malayan rubber industry—the condition of estates and factory buildings, the labor shortage, and the government's price policy on rubber. He also mentioned the first report of the Inter-Agency Policy Committee on Rubber recently published in Washington D. C., and noted the United States investment of \$700,000,000 in the synthetic rubber industry and the recommendation of the above committee to set up a National Rubber Supervisory Body to achieve a continuously coherent national rubber policy with a rubber director appointed by the President as chairman. Then he referred to British investment in plantation rubber, which he pointed out, is probably £200,000,000, excluding the native industry, which in the aggregate represented an acreage similar to that of the European-owned companies, and he suggested that with such vast interests at stake the British Government "might well copy the American proposal and set up such a permanent body."

After the report and accounts were adopted, the new chairman and vice chairman for the ensuing year were elected, F. D. Ascoli and W. J. C. Richards, respectively.

Mr. Ascoli joined Dunlop Rubber Co., Ltd., in January, 1926, and soon after was placed in charge of Dunlop Plantations, Ltd. Later he became managing director of the concern, a position he held until 1939 when Dunlop Malayan Estates, Ltd., was formed, and he resigned to become director and technical adviser of the new organization. Mr. Ascoli has been chairman of the council of the Institution of the Rubber Industry from 1930 to 1946; he served alternatively with Sir George Beharrell on the Manufacturers' Advisory Panel of the International Rubber Regulation Committee from 1934 to 1943, and during the war years served with the Ministry of Supply, first as deputy Controller of Rubber, then as Controller, and finally as Director of Rubber. He had much to do with promoting budgrafting on rubber estates, introduced the centrifuging process for latex in Malaya, and was the first to start latex shipments in bulk, with big installations in Singapore, Liverpool, Boston, and Le Havre.

Mr. Richards has had experience of the Far East since

1910, when he went out to India. He is a director of Linggi Plantations and Malacca Rubber Plantations in Malaya and of plantation companies in Burma and Netherlands India. He founded the Burma Planters' Association and was chairman of the Rubber Growers' Association Local Committee in Burma until 1939. From 1939 to 1943 he was representative of Burma on the International Rubber Regulation Committee.

Bulletin No. 1—1946, of the Rubber Growers' Association, reports on a number of matters dealt with at recent meetings of the council. First is the question of the price of rubber in Malaya. This subject has been frequently discussed in the House of Commons and in the press. The Bulletin states that at a recent meeting in Kuala Lumpur rubber growers voiced their discontent and sent a telegram of protest to the Colonial Secretary, and R. G. A. itself made representations to the Colonial Office. At the time the Bulletin was issued, discussions were still proceeding.

The next item concerns the plan to train young men for positions on rubber estates. Not so very long ago the custom was to engage likely young men in England and send them out as "creepers" to Far Eastern estates where they served an apprenticeship and learned about the various operations involved in planting and preparing rubber, keeping estate records, supervising native labor, etc. Apparently producers have meanwhile come to the conclusion that some preliminary training in the special duties required of European estate assistants was desirable, and in November, 1945, the R. G. A. council appointed a committee to consider and prepare a scheme for training future entrants into the rubber planting industry. Bulletin No. 1 reveals that the committee has made its report. The inquiry was divided into two parts, one dealing with the position in the immediate future, and the other with the long-term position. In connection with the first part, a number of agricultural colleges were approached on the question of planters' courses, and government departments in England and Scotland were applied to for training grants, and a planters' course was outlined which would cover training to 1947. The proposals for the long-term position have not yet been reported on.

A Colonial Employers' Federation was formed in London to represent employers of labor in the British colonies, dependencies, and mandated territories, in matters within the scope of the International Labor Office. The Federation will provide information on colonial labor questions for the I.L.O., government, and other interested parties; it will watch over legislative measures, promote and encourage joint consultation between the employers, and advise them on labor problems likely to affect their interests. The Rubber Growers' Association has become a member of the Federation.

Since the liberation of Malaya, the Association has been in touch with the United Planting Association of Malaya to which it has transmitted its views regarding the resumption of local activities, stressing the reestablishment of the District Planters' Associations.

British Rubber Industry Notes

In reply to a question in the House of Commons it was revealed by the Minister of Agriculture that in the six months ended March, 1946, 5,493 rubber-tired agricultural tractors were distributed for home use, and 969 for export.

The British Industries Fair is expected to be held in May, 1947, probably at Olympia and Earl's Court in London and Castle Bromwich in Birmingham. The Fair is directed at the development of export trade.

A meeting of the Plastics Group of the Society of Chemical Industry was held jointly with the Birmingham and Midland Section of the Society on May 10, in Birmingham, when D. W. Harbour, of Cellomold, Ltd., read a paper on "Some Solubility Relations in Phenol Formaldehyde Resins."

It is proposed to hold a Plastics Exhibition at Dorland Hall, London, next November.

The Distillers Co., Ltd., has offered Cambridge University an annual grant of £1000 for three years for research in the field of polymerization under Prof. R. G. W. Norrich. Dunlop Rubber Co., Ltd., will make available to the same institution £350 a year for seven years for the assistance of work on molecular construction under the direction of Dr. G. B. B. M. Sutherland.

The British Export Trade Research Organization, known as B.E.T.R.O. announces that its headquarters are at Premier House, 48 Dover St., London, W. I. The director of administration is H. A. P. Disney; the research and intelligence departments, under the direction of A. G. Jones, have already commenced operation. Activities in Norway, Sweden, Denmark, and Finland will be opened up by C. K. Squires, and

an office in Cairo is soon to be opened by P. Thornton. The contracts division is under the direction of S. L. Lewis. A training scheme to overcome the shortage of market research experts is in operation.

Biltac 10 Emulsion is a plasticizer and extender for latex which is claimed to be sufficiently stable for all commercial purposes and can be stored for long periods without fear of deterioration. The emulsion is a 50% dispersion in water and can be directly added to latex, substituting up to 20% of dry rubber content. No modification of formula is necessary, but the use of zinc carbonate instead of zinc oxide in the mix helps increase stability. The new preparation has a slightly softening effect on the vulcanized product, but does not affect curing time or aging properties; nor does it lead to excessive darkening in vulcanized articles. Since it is claimed to be non-toxic, it can also be used in the manufacture of nipples for feeding bottles.

Recently Rubber Bonders' Ltd., held a Rubber Bonding Exhibition in Luton, said to be the first of its kind in the world. A new process of bonding rubber to metal was the main object and attraction of the exhibition, and various practical applications were demonstrated—as rubber-bonded coupling plates, recoil gun mountings, anti-vibration mountings, and shear springs. The method utilized the process of electrical deposition of brass to metal before application of the rubber compound. Many of the exhibits were wartime developments and included couplings of midget size for torque instruments; new-type engine mountings for automobiles, airplanes, tanks, etc; rubber bonding in assembling and packing delicate Radar instruments and other electrical and industrial instruments; bonded rubber in electrical switch gear, and the new Jaru metal-bonded bearings and oil-seals.

Imports and Exports

The value of retained crude rubber imports into the United Kingdom during the first quarter of 1946 was £2,322,000, which at 1938 prices is equivalent to £1,230,000, compared with a quarterly average at 1938 prices of £1,061,000 in 1945. Exports during the first quarter of 1946 amounted to £177,000, equivalent at 1938 prices to £72,000, compared with a quarterly average at 1938 prices of £31,000 in 1945.

Retained imports of rubber manufacturers in the first quarter came to £5,000, equivalent at 1938 prices to £2,000, compared with a quarterly average of 1938 prices of £5,000 in 1945. Exports during the quarter amounted to £750,000, equivalent at 1938 prices to £346,000, compared with a quarterly average at 1938 prices of £81,000 in 1945.

FRANCE

Synthetic Rubber Industry for France?

The present demand for rubber under conditions when it is considered unlikely that natural rubber will be able to meet more than a portion of world needs for some years yet, once again brings up in France the question whether the country shall start producing artificial rubber or not. As the writer of an article on the subject in a recent issue of *Revue générale Caoutchouc*[1] puts it, the question really amounts to this: whether France shall be dependent on foreign sources for synthetic rubber or produce her own, and, hence, whether the French rubber goods manufacturing industry is to occupy a major or a minor position in world markets.

A sufficiently large number of representatives of the rubber industry appears in favor of domestic synthetic rubber production and to wish to see work started in this direction immediately, and the author referred to evidently expresses their viewpoint too when he states the case for synthetic rubber. The well-known qualities of natural rubber require no defense, he says, but emphasizes that it must be realized that the molecule of a product of vegetable origin lends itself to far fewer combinations than one of chemical origin, and that therefore the study of polymers and copolymers, which already has yielded practical results, is bound to make possible the solution of problems of application which would remain unsolvable with the molecule of natural rubber alone. What the

[1] Apr., 1946, p. 70.

proportion of synthetic rubber in the total consumption of rubber is likely to be cannot as yet be put in figures, he continues, but the ratio will depend, on the one hand, on the number of new synthetic rubbers placed at the disposal of industry and, on the other hand, on the extent of the development of a given branch of activity which might benefit by the new materials; for instance, the amount of special rubbers used in aviation from now on will depend on the development of aviation itself.

In conclusion, the author recalls that the question as to the advisability for France to develop her own synthetic rubber industry was first seriously discussed in May, 1939, at a meeting attended not only by representatives of the rubber industry, but also by chemists, professional men, planters, and government officials. He quotes the opinion, substantially reflecting his own, made by the Planters' representative on that occasion:

"It is our keen desire that research on synthetic rubber be developed in France, and possibly even that an industry be established. We have much to learn from artificial rubber, and I believe that through association with it new outlets can be created for natural rubber. In this respect, I share the opinion that far from excluding natural rubber, artificial rubber can provide it with the opportunity for new uses."

Antiseptic Rubber

Before the Academy of Sciences was recently presented a short article by Prof. Jacques Risler on the discovery of a method of giving rubber lasting antiseptic qualities. For many years Professor Risler occupied himself with the problem of discovering antiseptics which would remain effective over prolonged periods, and work on the application of suitable substances to such materials as wood, cellulose fabrics, and other solid materials eventually led to investigations also on rubber. Great difficulty was at first experienced here, however, because the volatile fillers employed evaporated at the vulcanization temperature. But eventually the difficulty was overcome; a para-iso propyl-meta-cresol was incorporated in crystalline form in a mixing made with standard smoked sheet. The chemical, soluble at the usual curing temperature, tends to resume its crystalline form as soon as the compound cools, when it is driven to the surface and confers on rubber antiseptic qualities which have been found particularly powerful and long-lasting if the proper proportion is used.

In experiments samples of rubber mixed with 20, 15, and 10% of para-iso propyl-meta-cresol were contacted with cultures of various bacteria for 15, 10, and five minutes and compared with a control sample of rubber without the para-iso-propyl-meta-cresol. Results indicated that the chemical does not become effective until about 15% calculated on the weight of the rubber is used, when diphtheria, typhoid and tuberculosis bacilli, and staphylococcus, for example, were destroyed in practically the same length of time.

The long-lasting effect of the chemical when 15% on the weight of the rubber is used is indicated by the fact that in tests started on August 5, 1945, samples retained their antiseptic powers apparently unimpaired, up to March 5, 1945, (evidently the date when Professor Risler submitted his report) that is for 212 days, and the experiment is still continuing.

The discovery is particularly welcomed in France as completing a general plan of improving hygienic conditions in dwelling places. It is considered to hold out new possibilities for rubber in the preparation of antiseptic compounds for rugs, soles for footwear, cushions, mattresses, sponge rubber seats, telephone apparatus, and bitumen-latex mixtures for road-surfacing, for example.

Increased Production of Rubber Goods

General production of rubber goods appears to be increasing steadily. More rubber is reportedly coming in from Indo-China, and France, which received 11,000 tons of crude rubber from this source in 1945, expects that 1946 arrivals will total 20,000 tons.

Output of tires from natural and synthetic rubber went up again in March, 1946, to 2,960 metric tons, against 2,598 metric tons in February, 1946. This figure compares with an average monthly production in 1938 of 3,500 tons. The number of passenger cars produced in March was 99,000, or more than twice the number made in December, 1945.

Judging from European press notices, France intends to take the place of Germany as provider of the various small

rubber wares that in prewar times formed the bulk of German rubber goods exports. Already France is said to be producing a sufficient quantity of this type of goods to export a certain amount.

The main obstacle to even speedier recovery in the rubber manufacturing industry now seems to be the shortage of labor—which apparently can only be remedied by an upward revision of wages.

LATIN AMERICA

By a decree of March 23, 1946, rubber manufacturers, other than automobile tires and tubes, have been removed from duty-free status, retroactive to February 19, 1946. Besides automobile tires and tubes, only natural rubber will continue to enter Argentina duty-free.

United States capital is interested in a projected plastics factory for Colombia. It is planned to start the factory in the Cali district, and small articles for the domestic market and for export to neighboring countries will be made from materials imported from the United States.

The discontinuance of tire rationing in Chile in 1945 was immediately followed by a rapid rise in prices and considerable black market activity so that rationing had to be resumed in the first quarter of 1946. Plans for the expansion of domestic tire production, which, if carried into effect, might have helped to ease the prevailing tire shortage, have had to be postponed because of the non-arrival of necessary machinery, and the country is now seeking larger imports of tires from the United States.

Rationing restrictions on sales of tires produced locally have been lifted by the Guatemalan Office of Economic Stabilization. Small quantities of bicycle, motorcycle, and automobile tires have been produced by the Compania Guatemalteca "Incatecu," and the production of truck tires is also to be started shortly. Incidentally, the company is permitted a profit not exceeding 30% over production costs.

Haiti did not commence sending rubber to the United States until 1943, and shipments during the fiscal year ended September, 1943, were only 12,760 pounds. In 1943-44, totals were 28,677 pounds, and in 1944-45, 24,255 pounds.

Exports of crude rubber from Panama in 1945 came to 319 metric tons, valued at $305,606, as compared with 358 metric tons, valued at $322,425, in 1944.

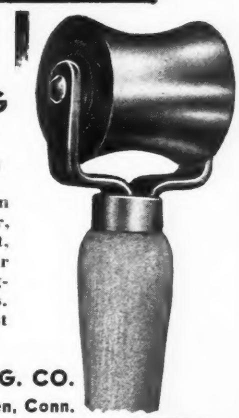
New York importers are paying 6¢ a pound more for Surinam balata in 1946 than they did in 1945 and, as a result, expect to obtain larger quantities of the commodity. Already the rise in price seems to have had its effect, for production in the first quarter of 1946 was reportedly 61,369 pounds, against 44,109 pounds in the corresponding period of 1945.

Careless tapping in the last few years is said to have killed many trees in Ecuador, and this circumstance combined with a labor shortage caused a considerable decline in exports of crude rubber during 1945. The 1945 shipments, amounting to 1,968 metric tons, were the lowest since 1941, when the total was 1,779 metric tons. Under the stimulus of war demand production increased considerably after 1941, permitting record exports of 3,035 metric tons in 1942; in 1943 there was a decline to 2,186 tons, followed by a renewed spurt to 2,801 metric tons in 1944. It is considered unlikely that production or exports will soon increase again to the levels reached in the prewar years. All rubber from Ecuador was shipped to the United States.

AUSTRALIA

During the war practically the only golf balls obtainable in Australia were remakes, but now, it is learned, both Dunlop and Slazengers are beginning to manufacture so that stocks of new balls are becoming available again, although not in sufficient quantity to meet all demands.

In the five months ended November, 1945, Australia imported 3,750 long tons of crude rubber, of which Ceylon supplied almost 79%.



Editor's Book Table

BOOK REVIEWS

"Rubber in Engineering." Prepared under the direction of the Controller of Chemical Research of the Ministry of Supply and the Directors of Scientific Research of the Ministry of Aircraft Production and the Admiralty, on the basis of research carried out by Imperial Chemical Industries, Ltd. Published by Chemical Publishing Co., Inc., 234 King St., Brooklyn 31, N. Y. Cloth, 5½ by 8½ inches. 284 pages. Price $5.50.

This book has been designed to interest a wide variety of readers. Its main purpose is to furnish engineers with a general survey of the information available on the fundamental properties of rubber. Accordingly, a considerable proportion of the text has been devoted to the theoretical aspects of the the subject. The chapters dealing with these aspects, however, have been so grouped that those readers who are more interested in the practical applications can omit them. The subject has been treated on the basis of many years of experience of authorities in the rubber and engineering fields, with detailed discussion of problems in the manufacture and use of rubber articles. Theoretical and practical data are presented to demonstrate that certain variables, ignored in other engineering materials, are of fundamental importance in the case of rubber.

Each chapter is replete with graphs, tables, and illustrations and has an appendix of literature references. Although containing data on both natural and various types of synthetic rubbers, most of the information presented is on natural rubbers. Much of the data included applies to types of synthetic rubber which have since been discontinued, and data are not given on the newer types and on the important developments in rubber technology of the past few years. The preface of the book warns against using data taken directly from tables given therein, as the tables are often quoted to illustrate a principle, and the figures generally have no absolute significance except for the particular rubber compound under discussion. Despite its limitations due to dating, however, the book represents a notable effort to compile and correlate a great deal of scattered and often indefinite information on rubber.

There are four sections to the book in addition to a preface and an introductory chapter. The first part deals with the rubber-like state. The second part, on the general properties of rubber, contains chapters on the mechanical properties of rubber; the effect of stress, fluctuation of stress and temperature; change of properties with age and service; theory of swelling in non-polar liquids; the conductivity of rubber (heat, sound and electricity); and the diffusion of gases through rubber. The three chapters comprising part three, rubber technology, cover the outline of rubber technology; compatibility and incompatibility of properties; and the bonding of rubber to metal, including a note on molding. Part four, on the principles of the design of rubber engineering components, consists of chapters on the factor of oil resistance in design; the relative merits of compression and shear in design and shape factors; shock absorption and vibration insulation; designing the rubber component; and specifications. There are also appendices on the dependence of deformation and mechanical losses upon time and temperature; the principal physical properties of rubber and their coefficients of change; the Dunlop Tripsometer; compression stress-strain relationship (static); and author and subject indices.

"Abstracts on Synthetic Rubber. Part III—Articles. Part IV—Patents." Muriel E. Whalley. National Research Council of Canada, Ottawa, Ont., Canada. February, 1946. Paper, 8½ by 10¾ inches. 435 and 300 pages, respectively. Price $2 each.

These publications are a continuation of former work on synthetic rubber abstracts on the manufacture of synthetic rubbers and related subjects. Also included are abstracts on the properties of the various synthetic rubbers and on work in connection with the improvement of such properties.

This valuable and extensive compilation of abstracts covers both domestic and foreign sources. Part III, on articles, comprises 910 abstracts of articles, arranged in alphabetical order by authors, with a subject index. Part IV, on patents, consists of 501 abstracts of patents arranged in chronological order with a subject index, an index of patentees, and a numerical patent index arranged according to countries. There is also a collection of 116 abstracts of patents seized by the Alien Property Custodian in the United States.

"Colloid Chemistry. Theoretical and Applied." Volume VI. "General Principles and Specific Industries. Synthetic Polymers and Plastics." Collected and edited by Jerome Alexander. Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y., 1946. Cloth, 6 by 9¼ inches. 1222 pages. Author and subject indices. Price $20.

This volume, the sixth in a comprehensive series on colloid chemistry, consists of two parts: General Principles and Specific Industries, with 38 papers; and Synthetic Polymers and Plastics, with 32 papers. The papers, prepared by international authorities in their fields, are devoted mainly to applications of colloid chemistry involved in the processes and products of industry, or of value to technology and technologists. Included are a few theoretical papers and a general article on nuclear fission and atomic energy. The book contains many tables, diagrams, and illustrations and provides a wealth of important material for all organic and physical chemists, biologists, and industrial research workers.

The paper on "Colloid Chemistry of Clay Minerals and Clay Films," by E. A. Hauser and D. S. le Beau, covers lattice structure, atomic substitution, base exchange, particle size, and others phases of work on clays, including silica, kaolin, talc, mica, and others. "Industrial Adhesives," by Alfred E. Gutman, gives a general outline of adhesives with specific discussion of various types, including rubber and synthetic resin adhesives, thermoplastics and emulsion adhesives, etc.

"Dispersions of Finely Divided Solids in Liquid Media," by Earl K. Fischer and David M. Gans, includes much information on the use of ball, pebble, and colloid mills of interest to the latex compounder. "Rubber Latex Technology," by R. W. Albright and R. A. Lees, covers the production, nature, and treatment of natural latex, latex compounds, and products used in industry. The paper on "Synthetic Rubber," by Hauser and le Beau, discusses the history, principles of the production, and properties of synthetic rubbers; synthetic latices and artificial dispersions, synthetic rubber reclaim, chemical considerations, structural considerations, X-ray studies; and under "Some Colloidal Chemical Aspects" it is emphasized that if the use and application of some reactions characteristic of the colloidal state of matter were more generally adapted to synthetic rubber research, it might help materially in arriving at a more general understanding of the reactions and aiding in the development of a truly synthetic rubber. This section also contains more information on natural *vs.* synthetic rubber latices. "The Comparative Behavior of Carbon Black in the Reinforcement of Natural and Synthetic Rubbers," by H. A. Braendle, points out that there have gradually evolved three basic properties of carbon blacks, viz., specific surface, pH, and structure which in various combinations afford an understanding of the behavior of carbon, or alternatively, make possible the development of new or special carbons for specific purposes.

Part II on Synthetic Polymers and Plastics leads off with a paper on "Some Principles Underlying the Behavior of Plastics," by Jerome Alexander; and includes several papers on the cellulose plastics; papers on "Polystyrene" by Ivey Allen, Jr., and Laurence Humphrey; "Styrene and Polystyrene," by J. Lawrence Amos; and "Dichlorostyrenes and Their Polymers," by J. C. Michalek and C. C. Clark; a paper on "Polyvinyl Resins," by G. C. Miller; on "The Colloid Aspects of Nylon," by J. B. Nichols; and on "Chlorinated Rubber," by John S. Tinsley; to mention a few. Part II also contains a paper on "Potential Nuclear Energy and Some Consequences of Its Release," by Mr. Alexander.

There are three appended papers, including one on "Synthetic Rubber" by Hauser and le Beau, and one on "Styrene and Polystyrene," by J. Lawrence Amos.

"The United Nations Economic and Social Council." Herman Finer. World Peace Foundation, Boston, Mass. 5⅜ by 8 inches. 120 pages. Price: cloth $0.50, paper $0.25.

This book is a study of the place of the Economic and Social Council in relation to the general purposes and functions of the United Nations, its relation to the various special agencies set up under the provisions of inter-governmental agreements, and its relation to the other organs of the U. N. The author points out that integrated international institutions are largely lacking in the welfare, cultural, social, and economic fields. This lack is a challenge to statesmen to create adequate instruments for the development of a world community based on sound economic relations and social justice.

The chapter headings cover world economic and social interdependence, world economic purposes and agencies, charter provisions for an economic and social council, and the tasks of the general assembly and the economic and social council. There are a bibliography of references and excerpts from the U. N. charter on the Economic and Social Council.

NEW PUBLICATIONS

"Barrett Rubber Compounding Materials." Rubber Laboratory Release No. 1 May 1, 1946. The Barrett Division, Allied Chemical & Dye Corp., New York, N. Y. 20 pages. This booklet gives results of three series of tests. The first, on the use of Cumar RH, Carbonex, and B.R.V. in a GR-S extruded and heat-resistant compound, gives formulation and properties obtained with varying curing cycles. The second and third series, using a GR-S-EPC black recipe, cover the use of increasing amounts of Bardol and the use of Cumar resins AX, BX, and CX, respectively. The results obtained with varying cures are given in the form of data on tension, abrasion, tear resistance, compression set, resilience, and hysteresis.

"Yarway Sealtite Try-Cocks." Bulletin WG-1815. Yarnall-Waring Co., Philadelphia, Pa. 4 pages. This bulletin illustrates and describes the different types of try-cocks made by the company for attachment to water columns or boiler drums. Recommended for higher pressure installations where conventional try-cocks may not stay tight, the body and the stem are made either of tobin bronze or stainless steel for pressures below and above 600 pounds, respectively. Dimensions, prices, and parts are also shown.

"Naugatuck Rubber Chemicals." Naugatuck Chemical Division, United States Rubber Co., New York, N. Y. 142 pages. This book is offered as a ready reference to information on the characteristics and uses of the company's rubber chemicals. Products are arranged according to function, with sections on accelerators, activators, anti-oxidants, and special products, and further subdivisions according to chemical structure where applicable. Each section is preceded by a preface explaining the functions of the group. Each chemical is listed individually, together with its chemical name and formula, physical properties, compounding properties, and recommended uses. Appendices include a table of decimal weight equivalents, a list of solubilities, a glossary of terms, and an index.

"How the Dominant Drive Speeds Production, Reduces Costs." Multiple V-Belt Drive Association, Chicago, Ill. 16 pages. Illustrations and text present the results of the engineering details of the multiple V-belt drive in terms of operating advantages to drive users. These advantages are covered in separate sections on delivered horsepower, drive durability, adaptability to fluctuating production schedules, savings in man-hours and shop space, and economy of installation and maintenance.

Publications of Shell Oil Co., Inc., New York, N. Y. **"Shell Dutrex 15E—**A General-Purpose Plasticizer for Natural and Synthetic Rubber." 18 pages. This booklet gives formulations and test results on the use of Dutrex 15E in GR-S tread stock, natural rubber tire carcass and tread stocks, mixtures of natural rubber and GR-S, and in other elastomers. There is also a section on compounding and test procedures used in the investigation. **"Dutrex 30—**A Light Process Oil for Neoprene." Report No. 1. 20 pages. This booklet has sections on the properties of Dutrex 30, test results on the effect of increasing proportions of the material in two GR-M compounds, effect of the material on processing characteristics and on vulcanizates, compatibility of the material with different black loadings compared with other process oils, examples of applications in specific Neoprene compounds, and use in GR-S. There is an appendix of notes on compounding and test procedures.

"Meyercord Decalcomania Sign Ad-Visor." Meyercord Co., Chicago 44, Ill. 20 pages. This brochure is issued as a guide to point-of-sale promotion and contains suggestions for dealer identification and product promotion. Reproducing 94 decal signs, the booklet shows where, when, and how to use decal store signs and suggests unusual designs and treatments. The various steps in the company's service are illustrated, from creative counsel to use testing.

"Witresin." Technical Service Report No. R-1. June 15, 1946. Witco Chemical Co., New York, N. Y. 4 pages. The use of Witresin, a petroleum-resin type of softener of comparatively low melting point, is described in this bulletin. Physical properties data and test results of vulcanizates indicate the material imparts properties similar to those obtained by the use of mineral rubbers and other resin-type softeners.

"Simplex-Anhydroprene." Data Sheet 115. Simplex Wire & Cable Co., Cambridge, Mass. 4 pages. This bulletin describes a line of wire and cables consisting of copper conductors insulated with Simplex-Anhydrex walls and having neoprene jackets. The wires are oil resistant and have low water absorption properties. Applications and uses are described together with operating and installation advantages.

"$200,000 Design for Progress Award Program." James F. Lincoln Arc Welding Foundation, Cleveland, O. 48 pages. This booklet gives the rules and conditions of the Foundation's award program designed to encourage the study of welded design, research, application, and the use of arc welding. The program is divided into various classifications and divisions, with awards in each group in addition to general awards. Of particular interest is classification F, industry machinery, division F-2 covering processing or plastics machinery or parts, and classification N on maintenance of plant and construction machinery.

"Human Relations and Efficient Production." National Association of Manufacturers, New York, N. Y. 28 pages. This booklet was prepared to help individual companies check on employe relations policies. It covers hiring and placing employes, induction into the job, wage rates, union-management relations, seniority, grievance procedure, plant rules and discipline, information to employes, employe benefits and services, and other topics. A check-list for plant use enables the employer to determine whether his plant is following employe relations policies adopted by NAM experts.

Bulletins of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. **"Shrinkage of Mold Cured Elastomer Compounds."** BL-208. April 15, 1946. 6 pages. This bulletin gives data on the effect of variations in loadings of clay and SRF black and in curing temperature on the shrinkage of neoprene compounds; a comparison of shrinkage of neoprene compounds containing equal-volume loading of various fillers; a comparison of shrinkage of neoprene, GR-S, and natural rubber compounds loaded with equal volumes of SRF black; and the effect of time of cure on shrinkage of neoprene compounds. **"Akroflex C Improves Heat Resistance of Butyl (GR-I) Vulcanizates."** BL-211. May 15, 1946. 2 pages. Test results are given to show that the use of 2% Akroflex C in Butyl reduces the tendency to deteriorate and soften after exposure to high temperatures. **"Processing of Fast Curing Neoprene."** BL-212. May 15, 1946. 4 pages. Directions are given on the proper use of sodium acetate as an effective and efficient retarder for fast-curing neoprene in the presence of magnesia and zinc oxide. Data are also included to show that blending normal-curing with fast-curing neoprene will not retard the rate of cure of the fast-curing stock.

"The Better Catalogue of Ply-Garb Job Tested Safety Clothing, White or Brown." The Millburn Co., 3246 E. Woodbridge, Detroit 7, Mich. 12 pages. **"Bi-Monthly Supplement to All Lists of Inspected Appliances, Equipment, Materials."** April, 1946. Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago 11, Ill. 60 pages. **"Data Book for 1946 Passenger Cars."** May 15, 1946. The Association of American Battery Manufacturers, Inc., Akron, O. 4 pages. **"Gaskets;** Rubber (Natural or Synthetic), Molded, Sheet, and Strip." Federal Specification HH-G-156, January 4, 1946. Superintendent of Documents, Washington, D. C. 5¢. **"Pyrometer Supplies**—Buyers' Guide. Price List—March 2, 1946. Thermocouples, Protecting Tubes, Thermocouple Wire, Leadwire, Insulators." No. 100-1. The Brown Instrument Co., Philadelphia 44, Pa. 40 pages. **"The Course of Autoxidation Reactions in Polyisoprenes and Allied Compounds.** Part XI. Double Bond Movement during the Autoxidation of a Mono-Olefin." E. H. Farmer and D. A. Sutton. Publication No. 67. 8 pages. The British Rubber Producers' Research Association, 48 Tewin Rd., Welwyn Garden City, Herts, England.

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Compounding Charts

(*Continued from page* 514)

the physical properties of a large group of compounds containing:

(a) the general-purpose rubbers — natural rubber, GR-S, and reclaim—individually and in combinations.

(b) various amounts of an unsaturated hydrocarbon extender, and

(c) various amounts of MPC black.

The charts are intended primarily to provide in a compact form information relating to changes in physical properties of compounds brought about by changing from one rubber hydrocarbon to another.

The changing of formulations, as well as setting up of compounds for new uses, necessitates a considerable amount of development work in the line of compounding. The data, as compiled in this investigation and graphically presented, can be used for predicting physical properties of a great variety of compounds and might prove to be of assistance in selecting a starting formula for many purposes. In some cases only slight adjustments, based on the personal experience of the compounder, might be necessary to find the desired final formula.

Acknowledgment

Most of the data reported in this article were collected in the laboratories of the Wilmington Chemical Corp., when the authors were employed there. The valuable cooperation received from R. Weil and H. I. du Pont and the rest of the staff of Wilmington Chemical Corp. laboratories is greatly appreciated.

Market Reviews

COTTON & FABRICS

NEW YORK COTTON EXCHANGE
WEEK-END CLOSING PRICES

Futures	Apr. 27	May 25	June 1	June 8	June 15	June 22
July	27.94	27.88	28.17	28.75	29.14	29.42
Sept.	27.95	28.06	28.34	28.90	29.28	29.47
Nov.	27.95	28.23	28.49	29.04	29.43	29.55
1947						
Feb.	27.95	28.38	28.68	29.24	29.55	29.65
Apr.	27.97	28.49	28.68	29.24	29.52	29.60
June	27.89	28.47	28.64	29.17	29.40	29.48

JUNE saw the highest levels reached in the market since the 1924 season. Opening June 1 at the low for the month, 28.77¢ a pound, the 15/16-inch spot middling prices scored gains until June 10, when it reached 29.80¢ a pound. Prices then fluctuated until they hit a high on June 27 at 31.66¢ a pound. The market closed on June 28, at 31.65¢ a pound.

The futures market, following the same general trend, opened on June 1 at 28.25¢ a pound, reached 29.16¢ a pound on June 10, fluctuated, and rose to a new high when the market closed on June 28, at 31.05¢ a pound.

The settlement of the railroad and soft coal strikes brought the mills back into the market and sent prices up. Further stimulating factors appeared to be the sentiment that Administration leaders believed that Congress would prefer to let price control die rather than to extend it without crippling amendments after June 30, the unfavorable weather conditions in the Cotton Belt, the unexpectedly sharp advance in the mid-May parity price, and the brightening outlook for exports.

The CCC cotton loan holdings fell to 499,000 bales as of June 8, with only 80,073 bales remaining under the 1945 loan. Purchases by the CCC totaled 400,246 bales in the 1945 crop cotton, compared with a total of 2,355,537 bales, in the same period last season. World carryover is expected to total 23,500,000 bales, a drop of 3,500,000 bales from the previous season's figures.

The announcement by the British Government that it would permit Liverpool and Manchester firms to continue raw cotton importation and distribution at least until September 30 was received here as a very hopeful sign.

Fabrics

With the future of the OPA still undecided, mills have adhered to the close selling policy. Goods of all types are being sought, but only insignificant amounts are being moved. The railroad and soft coal strikes also curtailed production and added to the generally tight market situation.

A bright note was the occasional preparation of a few producers to schedule better allotments of hose and belting ducks in anticipation of these items being included in the OPA's incentive pricing list. While this increase leaves much to be desired, rubber manufacturers look for an improvement in forward commitments.

Insulation cambric and separator cloth were suspended from price control on June 5. Insulation cambric used almost entirely in electrical manufacturing, represents less than 1% of the total dollar sales of the industry, so does not enter significantly into the cost of living; while the same holds true of separator cloth used in tires. Millmen, however, were unable to explain why OPA would lift controls on finished insulating cambrics, but retain them on the gray. CPA is still consistently rejecting appeals for relief under the M-317A distribution order.

New York Quotations June 30, 1946

Drills

38-inch 2.00-yard ....yd.	$0.195
50-inch 1.52-yard	.3628
52-inch 1.85-yard	.3050
52-inch 2.20-yard	.2617
59-inch 1.85-yard	.3050

Ducks

38-inch 2.00-yard D.F. ... ..yd.	.2665
40-inch 1.45-yard D.F.	.3601
40-inch 1.45-yard S.F.	.3525
51½-inch 1.35-yard D.F.	.3948
72-inch 1.05-yard D.F.	.5285

Mechanicals

Hose and belting...........lb.	.5030/.5031
Hose and belting, stitched.....	.49207

Tennis

5½-inch 1.60-yard D.F........	.34
51½-inch 1.60-yard D.F.	.34

Hollands—Rubber

20-inch ....yd.	.1225/.145
30-inch	.22 /.2575
40-inch	.245 /.29

Osnaburgs

36-inch 2.94 Cl. ....yd.	.15179
40-inch 2.11 P.W.	.1954
40-inch 2.65 Cl.	.16826
40-inch 3.65 Cl.	.13008

Raincoat Fabrics

Cotton

Bombazine 64 x 60, 5.35...yd.	.1375
Bombazine 64 x 56, 5.50.....	.1350
Print cloth, 38½-inch, 64 x 60.	.11369

Sheeting, 40-inch

48 x 44, 5.00-yard ....yd.	.182
64 x 68, 3.15-yard	.15555
56 x 60, 3.60-yard	.13333
44 x 40, 4.25-yard...........	.10941

Sheeting, 36-inch

48 x 44, 5.00-yard ....yd.	.96
40 x 40, 6.15-yard	.7804

Tire Fabrics—Karded Peeler

Builder

17¼ ounce 60" 23/11 ply..lb.	.48

Chafer

14 ounce 60" 20/8 ply.....lb.	.5367
14 ounce 60" 20/8 ply.....lb.	.5367
17½-ounce 60" ....lb.	.5252
9¼ ounce 60" 10/2 .ply....lb	.45

Cord Fabrics

25/5/3, 1 1/16" cotton.....lb.	.44
15/3/3, 1 1/15" cotton.....lb.	.42
12/4/2, 1 1/16" cotton.....lb.	.42
23/5/3, 1¼" cotton........lb.	.44

Leno Breaker

8¼ ounce and 10¼ ounce 60" ....lb.	.45

Converters say that an important part of industrial goods demand is currently being met through the stripping of military surplus finished twills and medium weight ducks, and they urged that the awards be promptly made so that goods could go into process for the many customers seeking them. Most of this yardage is finished with the JQD-242 treatment. The greatest volume of stripped goods has moved out for such industrial uses as upholstery, sport clothing, automobile seat covers, and simulated leather coatings. Stripped twills have been found particularly adaptable for vinyl chloride and pyroxylin coating, and heavy demand from leading Detroit automobile manufacturers has been reported for these coated fabrics. Cost of stripping, about 10¢ a yard, added to the landed cost at the mill for the surplus fabric, results in a price range around 35¢, which is a few cents higher than the gray ceilings.

All looms weaving gem duck on March 8, 1946, must continue or resume production of that material immediately by an amendment to Order L-99, the loom-freeze order. This action was taken to insure adequate production of gem duck, used in lining shoes.

CPA officials cited evidence of maldistribution of high-tenacity rayon in the hands of rubber manufacturers. These conditions prevent some companies from making all the tires they are now permitted to make with the rayon cord under the pattern established by List 15 of Appendix 2 of Rubber Order R-1; while other companies have more rayon than they need. To remedy this situation, the CPA rubber division proposed that the inventory of any one company can be restricted to not more than 60 days' supply, based on its current restricted production pattern. July 1 was the tentative date for the proposed new control to take effect.

British manufacturers, having substituted rayon for cotton yarn in the manufacture of tires during the war years, have found the change-over so successful that most of them continue to prefer rayon; however there is a serious shortage of high-tenacity tire yarns in Britain also.

Recorded statistics show that in 1940 United States tire manufacturers used 284,000,000 pounds of cotton tire cord. In 1941 the industry consumed 303,000,000 pounds of cotton and 17,000,000 pounds of rayon tire cord. In 1944 the respective figures rose to 188,000,000 and 72,000,000 pounds. Figures for 1945 are not yet tabulated, but it is believed that they will run far over the record year of 1941. Consumption for 1946 is expected to run even higher if supplies are obtainable.

Since 1945 there has been a sharp increase in the exports of rayon tire yarn, cord, and fabric; the current rate of rayon tire yarn and tire fabric exports represent about 8% of the domestic production of rayon tire yarn.

Concerning finished goods, there is considerable resentment among rubber manufacturers at being forced to accept such goods from the cotton textile concerns. With the exception of certain items for coated rainwear, gray goods are desired, and even in this instance special finishes are required that have a minimum of copper, manganese, and grease content. In other uses, finished goods are being accepted unwillingly, particularly as the added cost factor must be absorbed.

COMPOUNDING INGREDIENTS

Current Quotations*

Abrasives

Pumicestone, powdered	lb.	$0.035	/$0.04
Rottenstone, domestic	lb.	.025	/ .03

Accelerators, Inorganic

Lime, hydrated, l.c.l, N.Y.	ton	25.00	
Litharge (commercial)	lb.	.085	/ .09
Eagle, sublimed	lb.	.085	/ .09
FBS	lb.	.085	/ .09
Magnesia, calcined, extra light technical	lb.	.25	
Heavy technical	lb.	.05	/ .1275
Extra light U. S. P.	lb.	.26	
Medium light technical	lb.	.12	
Magnesia, light technical	lb.	.25	

Accelerators, Organic

A-10	lb.	.36	/ .42
A-19	lb.	.52	/ .58
A-32	lb.	.59	/ .69
A-77	lb.	.42	/ .55
A-100	lb.	.42	/ .55
Accelerator No. 8	lb.	.63	/ .65
49	lb.	.40	/ .42
552	lb.	1.63	
808	lb.	.59	/ .61
833	lb.	1.13	/ 1.15
Acrin	lb.	.65	
Advan.	lb.	.55	
Altax	lb.	.39	/ .41
Arazate	lb.	1.53	
B-J-F	lb.	.34	/ .39
Beutene	lb.	.59	/ .64
Butasan	lb.	1.10	
Butazate	lb.	1.10	
Butyl Eight	lb.	.97	/ .99
C-P-B	lb.	1.95	
Captax	lb.	.34	/ .4275
Cumate	lb.	1.60	
Cuprax	lb.	.60	/ .62
Di-Esterex-N	lb.	.50	/ .57
DOTG (Diorthotolyguanidine)	lb.	.44	/ .46
DPG (Diphenylguanidine)	lb.	.35	/ .41
El-Sixty	lb.	.36	/ .43
Ethasan	lb.	1.10	
Ethazate	lb.	1.10	
Ethlyidene Aniline	lb.	.42	/ .43
Ethyl Selenac	lb.	1.60	
Tuads	lb.	1.25	
Tuex	lb.	1.25	
Unads	lb.	1.25	
Formaniline	lb.	.36	/ .37
Goodrite Erie	lb.	.60	/ .62
Guantal	lb.	.39	/ .48
Hepteen	lb.	.34	/ .39
Base	lb.	1.25	/ 1.40
Lead Oleate Witco	lb.	1.75	
Ledate	lb.	1.20	
MBT	lb.	.34	/ .39
MBTS	lb.	.39	/ .44
Methasan	lb.	1.20	
Methazate	lb.	1.20	
Methyl Selanac	lb.	1.60	
Tuads	lb.	1.25	
Monex	lb.	1.25	
Mono Thiurad	lb.	1.25	
Morfex "33"	lb.	.60	/ .65
Novac	lb.	1.40	
O-X-A-F	lb.	.38	/ .43
Pentex	lb.	.74	/ .84
Flour	lb.	.1225	/ .1325
Phenex	lb.	.49	/ .54
Pipazate	lb.	1.53	
Pip-Pip	lb.	1.63	
Polyac	lb.	1.25	
R & H 50-D	lb.	.42	/ .43
R-2 Crystals	lb.	1.55	
Rotax	lb.	.44	/ .46
Safex	lb.	1.15	/ 1.25
Santocure	lb.	.60	/ .67
Selazate	lb.	1.60	
Setsit 5	lb.	.75	/ 1.00
SPDX-G	lb.	.53	/ .58
SRA No. 2	lb.	.53	/ .55
Super-Sulphur No. 2	lb.	.13	/ .15
Tetrone	lb.	1.25	
A	lb.	1.85	
Thiocarbanilide	lb.	.28	/ .33
Thiofide	lb.	.39	/ .46
Thionex	lb.	1.25	
Thiotax	lb.	.34	/ .41
Thiurad	lb.	1.25	
Thiuram E	lb.	1.25	
M	lb.	1.25	
Trimene	lb.	$0.54	/$0.64
Base	lb.	1.03	/ 1.18
Triphenylguanidine (TPG)	lb.	.45	
Tuex	lb.	1.25	
2-MT	lb.	.58	/ .60
Ulto	lb.	.99	/ 1.04
Ureka	lb.	.50	/ .57
Blend B	lb.	.50	/ .57
C	lb.	.48	/ .55
Vulcanex	lb.	.42	/ .43
Z-B-X	lb.	2.45	
Zenite	lb.	.37	/ .39
A	lb.	.42	/ .44
B	lb.	.39	/ .41
Zimate, Butyl	lb.	1.10	
Ethyl	lb.	1.10	
Methyl	lb.	1.20	

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing of all known ingredients. Prices are not guaranteed and those readers interested should contact suppliers for spot prices.

†Price quoted is f.o.b. works (bags). All prices are carlot.

Activators

Activex	lb.	.20	/ .22
Aero Ac 50	lb.	.46	/ .52
Barak	lb.	.50	
D-B-A	lb.	1.95	
Delac P	lb.	.39	/ .48
MODX	lb.	.295	/ .345
No. 2 RM Red Lead	lb.	.10	/ .105
Ridacto	lb.	.20	
SL-20	lb.	.1089	/ .1135

Alkalies

Caustic soda, flake, Columbia (400-lb. drums)	100 lbs.	2.50	
Liquid, 50%	100 lbs.	1.75	
Solid 100-lb. drums	100 lbs.	2.10	

Antioxidants

AgeRite Alba	lb.	1.95	/ 2.05
Gel	lb.	.52	/ .54
H.P.	lb.	.53	/ .55
Hipar	lb.	.61	/ .63
Powder	lb.	.40	/ .42
Resin	lb.	.43	/ .45
D	lb.	.40	/ .42
Stalite	lb.	.40	/ .42
White	lb.	1.23	/ 1.33
Akroflex C	lb.	.53	/ .55
Albasan	lb.	.69	/ .74
Aminox	lb.	.40	/ .49
Antox	lb.	.54	/ .56
Aranox	lb.	1.95	
Betanox	lb.	.43	/ .52
B-L-E	lb.	.40	/ .49
Powder	lb.	.61	/ .70
B-X-A	lb.	.43	/ .52
Copper Inhibitor X-872-A	lb.	1.15	
Flectol H	lb.	.40	/ .47
Flexamine	lb.	.53	/ .62
Neozone (standard)	lb.	.61	/ .63
A	lb.	.40	/ .42
C	lb.	.43	/ .45
D	lb.	.40	/ .42
Distilled	lb.	.45	/ .47
E	lb.	.61	/ .63
Oxynone	lb.	.77	/ .90
Parazone	lb.	.68	
Perflectol	lb.	.53	/ .60
Permalux	lb.	1.18	/ 1.20
Santoflex B	lb.	.40	/ .47
BX	lb.	.54	/ .61
Santovar-O	lb.	1.15	/ 1.40
Santowhite	lb.	1.23	/ 1.38
Solux	lb.	1.28	/ 1.30
Stabilite	lb.	.48	/ .50
Alba	lb.	.69	/ .74
Thermoflex	lb.	1.18	/ 1.20
A	lb.	.61	/ .63
C	lb.	.54	/ .56
Tonox	lb.	.50	/ .59
Tysonite	lb.	.165	/ .1725
V-G-B	lb.	.43	/ .52

Antiscorch Materials

Cumar RH	lb.	.105	
Delac J	lb.	.50	/ .60
E-S-E-N	lb.	.34	/ .39
R-17 Resin (drums)	lb.	.1075	
RM	lb.	1.25	
Retarder W	lb.	.36	
Retardex	lb.	.445	/ .475
U-T-B	lb.	.34	/ .39
Vultrol	lb.	.50	/ .55

Antiseptics

Compound G-4	lb.	.95	/ 1.40
G-11	lb.	4.50	/ 4.75
Resorcinol	lb.	.64	

Antisun Materials

Antisol	lb.	.23	/ .28
Heliozone	lb.	.23	/ .24
S.C.R.	lb.	.32	/ .34
Sunproof	lb.	.2275	/ .2775
Jr.	lb.	.1625	/ .2125

Blowing Agents

Unicel	lb.	.50	

Brake Lining Saturant

B.R.T. No. 3	lb.	$0.0175	/$0.0185

Carbon Black

Conductive Channel—CC

Conductex A	lb.	.05	/ .085
Continental R20	lb.	.0455	
R40	lb.	.105	/ .14
Huber 35-C	lb.	.075	
Spheron C	lb.	.0455	
I	lb.	.0405	
N	lb.	.15	
Voltex	lb.	.105	/ .14

Hard Processing Channel—HPC

Continental F	lb.	.05†	/ .0725
HX	lb.	.05†	/ .0725
Kosmobile S/Dixiedensed S	lb.	.05†	/ .0725
Micronex Mark II	lb.	.05†	/ .0725
Spheron No. 4	lb.	.05†	/ .0725
Witco 6	lb.	.05†	/ .0725

Medium Processing Channel—MPC

Arrow TX	lb.	.05†	/ .0725
Continental A	lb.	.05†	/ .0725
Huber TX	lb.	.05†	/ .0725
Kosmobile S-66/Dixiedensed S-66	lb.	.05†	/ .0725
Spheron No. 6	lb.	.05†	/ .0725
Standard Micronex	lb.	.05†	/ .0725
Witco 1	lb.	.05†	/ .0725

Easy Processing Channel—EPC

Continental AA	lb.	.05†	/ .0725
Kosmobile 77/Dixiedensed 77	lb.	.05†	/ .0725
Micronex W-6	lb.	.05†	/ .0725
Spheron No. 9	lb.	.05†	/ .0725
Witco 12	lb.	.05†	/ .0725
Wyex	lb.	.05†	/ .0725

Conductive Furnace—CF

Statex A	lb.	.08	/ .10
Sterling I	lb.	.09	

Fine Furnace—FF

Statex B	lb.	.07	/ .09

High Modulus Furnace—HMF

Continex	lb.	.16	
Kosmos 40/Dixie 40	lb.	.05	/ .075
Modulex	lb.	.05	
Philblack A	lb.	.05	/ .06
Statex 93	lb.	.05	/ .075
Sterling L	lb.	.05	

Semi-Reinforcing Furnace—SRF

Continex	lb.	.035	/ .055
Essex	lb.	.035	/ .055
Furnex	lb.	.035	/ .06
Gastex	lb.	.035	/ .06
Kosmos 20/Dixie 20	lb.	.035†	
Pelletex	lb.	.035	/ .06
Sterling	lb.	.035†	
Witco	lb.	.035	/ .055

Fine Thermal—FT

P33	lb.	.045	

Medium Thermal—MT

Thermax	lb.	.0225	

Colors

Black

Lampblack (commercial), l.c.l.	lb.	.12	/ .14

Blue

Du Pont	lb.	.90	/ 3.95
Toners	lb.	.30	/ 3.50

Brown

Mapico	lb.	.1135	

Green

Chrome	lb.	.25	
oxide (freight allowed)	lb.	.25	
Chromium Hydroxide	lb.	.70	
Du Pont	lb.	1.10	/ 2.85
Guignet's (bbls.)	lbs.	.70	
Toners	lb.	.35	/ 4.00

Orange

Du Pont	lb.	2.35	/ 3.05
Toners	lb.	.30	/ 1.50

Red

Antimony			
Crimson, 15/17%	lb.	.48	
R.M.P. No. 3	lb.	.48	
Sulphur free	lb.	.52	
7-A	lb.	.37	
Z-2	lb.	25	
Du Pont	lb.	.48	/ 1.65
Iron Oxide, l.c.l.	lb.	.07	/ .15
Mapico	lb.	.0885	/ .096
Rub-Er-Red (bbls.)	lb.	.0975	
Toners	lb.	.25	/ 4.15

White

Lithopone (bags)	lb.	$0.0425/$0.045
Albalith	lb.	.0425/ .045
Eagle	lb.	.0725/ .0750
Titanium Pigments		
Raycal	lb.	.055 / .0575
Rayox LW	lb.	.145 / .1525
R-110	lb.	.155 / .1625
Titanox-A LO and MO	lb.	.145 / .15
C	lb.	.055 / .0575
Zopaque (50-lb. bags.)	lb.	.145
Zinc Oxide		
Azo ZZZ-11	lb.	.0725/ .075
44	lb.	.0725/ .075
55	lb.	.0725/ .075
66	lb.	.905 / .0975
Eagle, lead free	lb.	.0725/ .0750
French Process, Florence		
Green Seal-8	lb.	.09 / .0925
Red Seal-9	lb.	.085 / .0875
White Seal-7	lb.	.095 / .0975
Kadox, Black Label-15	lb.	.0725/ .075
No. 25	lb.	.085 / .0875
72	lb.	.0725/ .075
Red Label-17	lb.	.0725/ .075
Horse Head XX Special 3	lb.	.0725/ .075
XX Red-4	lb.	.0725/ .075
78	lb.	.0725/ .075
156	lb.	.0725/ .075
166	lb.	.0725/ .075
St. Joe (lead free)		
Black Label	lb.	.0725/ .075
Green Label	lb.	.0725/ .075
Red Label	lb.	.0725/ .075
U.S.P. No. 12	lb.	.105 / .1075
Zinc Sulphide Pigments		
Cryptone ZS No. 800	lb.	.0825/ .085

Yellow

Du Pont	lb.	1.37 / 1.75
Mapico	lb.	.0685/ .071
Toners	lb.	.50 / 1.37

Dispersing Agents

Bardex	lb.	.0425/ .045
Bardol	lb.	.02 / .0275
B	lb.	.05 / .0525
Darvan No. 1	lb.	.155 / .30
2	lb.	.19 / .30
Nevoll (drums, c.l.)	lb.	.02 / .025
Triton R-100	lb.	.12 / .25

Extenders

Advagum 1098	lb.	.42
1198	lb.	.40
Dielex	lb.	.055 / .06
Alba	lb.	.45
Extender 15	lb.	.32
Extender C	lb.	.15
Naftolen R-100	lb.	.11 / .12
Oroplast H	lb.	.1125/ .1175
L	lb.	.0725/ .0825
M	lb.	.0825/ .0925

Fillers, Inert

Asbestos Fiber	ton	15.50 /48.00
Barytes	ton	25.55 /40.00
Off color, domestic	ton	29.00
White, domestic	ton	38.50 /40.00
Blanc fixe, dry, precip.	ton	80.00
Champion	ton	11.00 /23.50
Langford	ton	8.50
McNamee	ton	11.00
Pyrax A	ton	10.00
W.A.	ton	11.50
Whiting		
Suprex White (precipated calcium carbonate)	ton	32.50
Witcarb R-12	ton	32.50
Witco, c.l.	ton	6.50

Finishes

Mica, l.c.l.	lb.	.045 / .055
Rubber lacquer, clear	gal.	1.00 / 2.00
Colored	gal.	2.00 / 3.50
Shoe varnish	gal.	1.45
Talc	ton	25.00 /35.00
Van Wax	gal.	1.25 / 1.30

Flock

Cotton flock, dark	lb.	.095 / .112
Dyed	lb.	.45 / .85
White	lb.	.12 / .20
Fabrifil X-24-G	lb.	.095
X-24-W	lb.	.135
Filfloc 6000	lb.	.16
F-40-9000	lb.	.105
Rayon flock, colored	lb.	1.00 / 1.50
White	lb.	.75 / 1.25

Latex Compounding Ingredients

Accelerator 89	lb.	1.20
122	lb.	1.30
Advawet	lb.	.46
Aerosol (drums)	lb.	.35
Antox, dispersed	lb.	.54
Aquarex BBX Conc.	lb.	.70
Areskap No. 50	lb.	.18 / .24
100, dry	lb.	.39 / .51
Aresket No. 240	lb.	.16 / .22
300, dry	lb.	.42 / .50
Aresklene No. 375	lb.	$0.35 /$0.50
400, dry	lb.	.51 / .65
Black No. 25, dispersed	lb.	.22 / .40
Casein	lb.	.24 / .2475
Collocarb (Dispersed Wyex)	lb.	.06 / .07
Copper Inhibitor X-872	lb.	2.25
Darvan No. 1	lb.	.30 / .34
2	lb.	.30 / .34
Dispersex No. 15	lb.	.11 / .12
20	lb.	.08 / .10
Factex Dispersion A	lb.	.185
Marmix	gal.	1.35 / 1.75
Micronex, Colloidal	lb.	.06 / .07
Nevilloid C-55	lb.	.12
pHR	lb.	1.25
Resin V	lb.	.13
Santomerse D	lb.	.41 / .65
S	lb.	.11 / .25
Sodium Stearate	lb.	.40
Stablex A	lb.	.90 / 1.10
B	lb.	.70 / .90
C	lb.	.40 / .50
Sulphur, dispersed No. 2	lb.	.08 / .12
Tepidone	lb.	.63
Zinc oxide, dispersed	lb.	.12 / .15

Mineral Rubber

Black Diamond, l.c.l.	ton	25.00 /30.00
B.R.C. No. 20	lb.	.0105/ .0115
Hydrocarbon, Hard	ton	25.00 /27.00
Lode	lb.	.04 / .045
Parmr	ton	21.00 /29.00
Pioneer, c.l.	ton	25.00 /30.00
Witco MR solid	ton	25.00
Granular	ton	30.00

Mold Lubricants

Aluminum Stearate	lb.	.23 / .24
Aquarex D	lb.	.60
MDL Paste	lb.	.25
Colite	gal.	.90 / 1.15
DC Mold Release Emulsion No. 35	lb.	2.60 / 3.50
Fluid	lb.	5.70 / 6.15
Dipex	lb.	.1275/ .15
Glycerized Lubricant (concentrate)	gal.	1.50
Lubrex	lb.	.25 / .30
Rubber-Glo, conc. regular	gal.	.94 / 1.15
Type W	gal.	.99 / 1.20
Sericite	ton	65.00
Soapstone, l.c.l.	ton	15.00 /35.00
Zinc stearate	lb.	.30 / .31

Reclaiming Oils

B.R.V.	lb.	.03 / .0375
BWH-1	lb.	.10
C-10	gal.	.19 / .24
D-4	gal.	.17 / .22
E-5	gal.	.15 / .20
No. 1621	lb.	.016 / .0235
S.R.O.	lb.	.015 / .0225
Wilcor III	gal	.26 / .30
151	gal.	.26 / .30
X-60 (reclaiming)	gal.	.20 / .28
X-443	gal.	.20 / .27

Reinforcers, Other Than Carbon Black

Buca	ton	40.00
Carbonex Flakes	lb.	.03 / .035
S	lb.	.031 / .036
Plastic	lb.	.031 / .0335
Clays		
Aerfloted Hi-White	ton	10.00
Paragon	ton	10.00
Suprex	ton	11.00 /23.50
Aluminum Flake	ton	20.25 /24.50
Calcene T.	ton	37.50 /45.00
Catalpo, c.l.	ton	30.00
China	ton	25.00
Crown	ton	11.00 /23.00
Dixie	ton	12.00
Hydratex R	ton	20.00
"L"	ton	10.00
Kalite	ton	26.00
Kalvan	ton	100.00
Magnesium carbonate l.c.l.	lb.	.0625/ .075
Magnolia	ton	10.00
No. 33	ton	30.00
Par	ton	11.00
Paraforce, c.l.	ton	50.00
Witco, Nos. 1 and 2, c.l.	ton	25.00
Cumar EX	lb.	.0525
MH	lb.	.065 / .1175
V	lb.	.0975/ .1275
465 Resin	lb.	.035
"G" Resin	lb.	.08
Nevindene	lb.	.105 / .135
Resinex	lb.	.0275/ .0325
Silene "EF"	lb.	.055 / .06
Silical	ton	65.00 /85.00
Witcarb R, c.l.	ton	100.00

Reodorants

Coumarin	lb.	2.75 / 3.25
Curodex 19	lb.	4.75
188	lb.	5.75
198	lb.	6.75
Para-Dors (ABCDE)	lb.	.25 / 4.00
Rodo No. 0	lb.	$4.00 /$4.50
10	lb.	5.00 / 5.50
Vanillin	lb.	2.25 / 2.95

Rubber Substitutes

Black	lb	.09 / .15
Brown	lb.	.105 / .1875
Factice		
Amberex Type B	lb	.20
Brown	lb	.095 / .19
Neophax A	lb	.165
B	lb	.165
White	lb	.10 / .20
White	lb.	.0975/ .165

Softeners and Plasticizers

Abalyn	lb	.0722/ .0947
Ambidex	lb	.23
"S"	lb.	.23
B.R.T. No. 7	lb	.02 / .021
Belro Resin	100 lbs	2.71 / 3.00
Bondogen	lb	.55 / .60
Bunnatol G	lb	.40 / .50
S	lb	.40 / .50
Butac	lb.	.085 / .105
Butyl Roleate	lb.	.16 / .195
Capryl Alcohol	lb	.16 / .195
Circosol-2XH Elasticator for GR-S	gal	
Dibenzyl sebacate	lb	.67 / .74
Phthalate	lb	.51 / .59
Dibutyl sebacate	lb	.46 / .565
Dicapryl phthalate	lb	.25 / .30
Dipentene	gal	.56 / .58
Dipolymer oil	gal.	.33 / .38
Dispersing Oil No. 10	lb	.0375/ .04
Duraplex C-50 LV, 100%	lb	.25 / .295
Dutrex 6	lb	.025 / .0375
Econo-Plast	lb	.0325/ .0375
Hercolyn	lb	.1122/ .1347
JMH	lb	.65 / .67
Marbon S	lb.	.55 / .65
S-1	lb.	.55 / .65
Multi-Plast	lb	.0425/ .0475
Myristilene	lb	.20 / .30
Naftolen HV	lb.	.11 / .12
MV	lb	.0525/ .0575
LV	lb	.0525/ .0575
Nevinol	lb.	.13
No. 1-D Heavy Oil	lb.	.04
Nuba resinous pitch (drums)		
Grades No. 1 and No. 2	lb.	.029
3-X	lb.	.0425
Palmalene	lb.	.15
Para Flux (reg.)	gal	.17 / .18
No. 2016	gal	.135 / .19
Para Lube	lb.	.046 / .048
Paradene No. 1 (drums)	lb.	.0525
No. 2	lb.	.0525
Special (drums)		
20 to 35° C. M.P.	lb.	.0265
35 to 46° C. M.P.	lb.	.0625
45 to 75° C. M.P.	lb.	.0575
Paraplex A1-111	lb.	.21 / .25
G-25, 100%	lb.	.75
Phthalate	lb.	.51 / .59
Paroils	lb.	.0975/ .18
Picco-100	lb.	.09
Piccocizer "30"	lb.	.055 / .06
Piccolastic A-5	lb.	.24 / .245
Piccolyte Resins	lb.	.15 / .185
Piccoumaron Resins	lb	.045 / .15
Piccovol	lb.	.20 / .25
Pictar	gal.	.18 / .23
Oil	gal	.45
Plasticizer B	lb	.35 / .45
35	lb.	.205 / .24
36	lb.	.305 / .34
Plastoflex No. 10	lb.	.20
No. 20	lb.	.25
Plastogen	lb.	.0775/ .08
Plastone	lb.	.27 / .30
Poly-pale Resin	lb.	.06 / .07
R-19 Resin (drums)	lb.	.1075
21 Resin (drums)	lb.	.1075
Reogen	lb.	.115 / .12
Resin R6-3	lb.	.38 / .40
Ridbo 369	lb.	.08 / .09
F	lb.	.12
Rio Resin	lb.	.36 / .38
RPA No. 1E	lb.	.55
2	lb.	.65
3	lb.	.46
4	lb.	.80
5	lb.	.57
Rubberol	lb.	.185
Santicizer B-16	lb.	.32 / .36
E-15	lb.	.34 / .38
M-17	lb.	.355 / .39
Sebacic acid	lb.	.48 / .55
Solvenol	gal.	.56 / .58
Staybelite	lb.	.06 / .065
Syntac	lb.	.275 / .35
TR-11	lb.	.035
Tarzac	lb.	.23 / .24
Tricesyl phosphate	lb.	.24 / .245
Turgum "S"	lb.	.0675
Vinsol Resin	lb.	.025 / .035
Vistac No. 1	lb.	.20 / .214
No. 2	lb.	.214 / .227
Witco No. 20, l.c.l.	gal.	.175
X-1 resinous oil (tank car)	lb.	.011 / .016
XX-100 Resin	lb.	.0525

Softeners for Hard Rubber Compounding

Resin C Pitch 45° C. M.P.	lb.	$0.01	/$0.016
60° C. M.P.	lb.	.01	/ .016
75° C. M.P.	lb.	.01	/ .016

Solvents

Carbon bisulphide	100 lbs.	5.00	/ 5.75†
Tetrachloride	gal.	.73	/ .94†
Cosol No. 1	gal.	.26	/ .34
2	gal.	.25	/ .33
3	gal.	.22	/ .30
GVL	lb.	1.00	
Industrial 90% benzol (tank car)	gal.	.15	/ .22
Nevsol	gal.	.245	/ .31
Picco	gal.	.22	/ .32
Skellysolve	gal.	.071	/ .105
Tollac	gal.	.28	/ .33

Stabilizers for Cure

Barium stearate	lb.	.29	/ .32
Calcium stearate	lb.	.26	/ .27
Laurex (bags)	lb.	.1475	/ .1725
Magnesium stearate	lb.	.31	/ .32
Stearex, single pressed	lb.	.15⅜	/ .16⅜
Double pressed	lb.	.15⅞	/ .16⅞
Beads	lb.	.14⅞	/ .15⅞
Stearic acid, single pressed	lb.	.15⅜	/ .16⅜
Stearite, c.l.	lb.	.14⅞	
Zinc Laurate	lb.	.29	/ .32
Stearate	lb.	.30	/ .31

Synthetic Rubber

Butaprene NF	lb.	.45	/ .60
NL	lb.	.46	/ .63
NXM	lb.	.50	/ .65
Chemigum N-1	lb.	.53	/ .60
Hycar Latex (dry weight)			
OR-15	lb.	.415	/ .465
OR-25	lb.	.345	/ .395
OS-10	lb.	.345	/ .395
Hycar OR-15	lb.	.43	/ .455
OR-25	lb.	.36	/ .385
OS-10	lb.	.36	/ .385
Neoprene Latex Type (dry weight)			
60	lb.	.28	/ .32
571	lb.	.25	/ .29
Concentrated	lb.	.28	/ .32
572	lb.	.28	/ .32
Neoprene Type CG	lb.	.50	
E	lb.	.65	
FR	lb.	.75	
KNR	lb.	.75	
M	lb.	.65	
Paraplex X-100	lb.	1.00	
Perbunan 18	lb.	.35	/ .375
26	lb.	.36	/ .385
35	lb.	.38	/ .455
Latex Type H (55%)	lb.	.38	/ .42
Silastic			
Coating and Laminating Grades			
No. 120	lb.	3.80	/ 4.40
125	lb.	3.80	/ 4.40
Molding and Extrusion Grades			
No. 150	lb.	3.35	/ 3.95
160	lb.	2.90	/ 3.50
167	lb.	2.90	/ 3.50
180	lb.	3.35	/ 3.95
Synthetic 100	lb.	.41	

Tackifiers

B.R.H. No. 2	lb.	0.15	
Piccolastic A-25	lb.	.24	/ .245
Plastic	lb.	.12	
Synthol	lb.	.225	
Synvarite Rc-50	lb.	.40	
Ty-Ply Q	gal.	6.75	/ 8.00
QA	gal.	6.75	/ 8.00
S	gal.	6.75	/ 8.00
SA	gal.	6.75	/ 8.00

Vulcanizing Ingredients

Dibenzo GMF	lb.	1.50	
GMF	lb.	1.95	
Magnesia, light (for neoprene)	lb.	.25	
Sulfur	100 lbs.	2.05	
Insoluble, 60	lb.	.16	
Rubbermaker's commercial	100 lbs.	2.05	
Refined	100 lbs.	2.40	
Telloy	lb.	1.75	
Vandex	lb.	1.75	
Vultac 1	lb.	.38	/ .45
2	lb.	.38	/ .45
3	lb.	.42	/ .49

Waxes

Carnauba, No. 3 chalky	lb.	.7125	
2 N.C.	lb.	.7675	
3 N.C.	lb.	.735	/ .745
1 Yellow	lb.	.8325	
2	lb.	.8125	
Carnube	lb.	.49	/ .59
Monten	lb.	.12	/ .17
Rubber Wax No. 118			
Colors	gal.	.86	/ 1.41
Neutral	gal.	.76	/ 1.31

RECLAIMED RUBBER

THE reclaimed rubber market remained unchanged during June with a continuing excess demand for all types of reclaims. Orders far exceed production figures, and shipments continue behind schedule. The greatest headache to reclaimers is still the contamination of natural scrap with synthetic, and *vice versa*. A promising note is the perceptible increase in demand for synthetic reclaim apparent during the past month. Relief may therefore be in sight for the large stocks of synthetic scrap on hand at most reclaiming centers. This demand for synthetic reclaim is expected to increase further upon the establishment of the forthcoming higher prices for natural rubber now under discussion. This price increase for natural rubber should do much to deemphasize the price differential between natural and synthetic reclaims which is held to be the major factor keeping down demand for synthetic reclaim.

Final figures for the reclaiming industry in March are now available in place of the preliminary figures given in our June issue. Production of reclaim in March was 25,136 long tons, and consumption was 22,075 long tons, in place of the preliminary figures of 25,148 and 22,101, respectively. Exports during March were 1,841 long tons, which agree with earlier figures, and stocks at the end of the month totaled 31,436 long tons, instead of the earlier estimate of 31,422 long tons. Preliminary figures for April show production of 23,937 long tons, consumption of 22,469 long tons, exports of 1,238 long tons, and end-of-the-month stocks of 31,666 long tons. Production and exports of reclaim therefore decreased in April from the figures for March; while consumption and stocks rose slightly.

Confirmation of the ½¢ per pound rise in ceiling prices for reclaims noted in our June issue has been received from OPA. This increase is given in Amendment 7 to RPS 56, effective as of May 31, and is reflected in our current listing of prices. A corresponding increase for reclaim produced on a service basis was also granted. The OPA statement of considerations involved in the issuance of the price rise makes mention of the increases in costs of labor and materials and the reduction in reclaim production due to contamination. The statement also notes that the industry is operating at top capacity and will probably continue to do so throughout the ensuing year.

Reclaimed Rubber Prices

Auto Tire

	Sp. Grav.	¢ per Lb.
Black Select	1.16-1.18	7½ / 7¾
Acid	1.18-1.22	8½ / 8¾

Shoe

Standard	1.56-1.60	8 / 8¼

Tubes

Black	1.19-1.28	12¼ / 12½
Gray	1.15-1.26	13 / 14
Red	1.15-1.32	13 / 13½

Miscellaneous

Mechanical blends	1.25-1.50	5¼ / 6½

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

SCRAP RUBBER

ACTIVITY in the scrap rubber market continued limited by the apathetic position of consumers. Although already slowed down, movement of scrap was further reduced by the labor tie-up in Akron consuming mills midway in June that held up shipments of tires and tire parts to outlets there. Outlets in the East were also practically closed down, with some buyers requiring such stringent specifications that dealers were reluctant to ship. One or two reclaimers continued to take material without the now-customary added requirement of percentage synthetic and natural, as well as specified ratios between truck and bus and passenger tires. One mill in the East merely required separate loading of synthetic and natural.

Tire parts were practically out of the market as a trading item. Here and there, some shipments of No. 3 peelings were made, but other classifications, including the S.A.G., were unwanted, and even tires were being taken cautiously. The restrictions on percentages of rubber and ratios of tires precluded any large shipments.

Dealers' quotable prices for tires in the Akron market showed another recession. It was noted that truck and bus tires were off 50¢ to $17 per net ton; while beadless tires suffered a similiar decline to $24. Mixed auto tires remained steady at $18 per net ton, and none of the corresponding eastern prices were revised.

Following are dealers' buying prices for scrap rubber in carload lots, delivered at points indicated:

	Eastern Points	Akron O.
	(Net Tons)	
Mixed auto tires	$17.50	$18.00
Truck and bus tires	17.50	17.00
Beadless tires	23.00	24.00
S.A.G. passenger (natural)	17.50	18.00
S.A.G. passenger (synthetic)	nom.	nom.
S.A.G. truck (natural)	15.50	nom.
S.A.G. truck (synthetic)	nom.	nom.
No. 1 peelings (natural)	44.00	nom.
No. 1 peelings (synthetic)	nom.	nom.
No. 1 peelings (recap.)	37.00	nom.
No. 2 peelings (natural)	30.00	30.00
No. 2 peelings (synthetic)	nom.	nom.
No. 2 peelings (recap.)	23.00	nom.
No. 3 peelings (natural)	28.00	28.50
No. 3 peelings (synthetic)	nom.	nom.
	(¢ per Lb.)	
Mixed auto tubes	5.5	5.25
Red passenger tubes	7.25	7.25
Black passenger tubes	6.25	6.25
Black truck tubes	6.0	6.125
Mixed puncture-proof tubes	2.0	2.0
Air brake hose	nom.	nom.
Rubber boots and shoes	nom.	nom.

Foreign Trade Opportunities

(*Continued from page 566*)

Export Opportunities

M. De Cannière & M. Libion, 20 Rue Mont Rose, Brussels, Belgium: elastic cloth for suspenders and girdles.

Attilio Manenti, 47 Piazza del Duomo, Florence, Italy: rubber hardware goods such as tire repair materials, hose, packing, washers, valves.

Juan H. Darquea, Montalvo No. 811, Ambato, Ecuador: automotive parts and accessories, refrigerators and electrical equipment.

Constantine Nicolaidis, Manager, "Medica," M. Camariotou St., Athens, Greece: chemicals, druggists' rubber sundries, surgical and hospital equipment and supplies, plastics and plastic products, drugstore merchandise.

H. K. Lee, representing Eng Aun Tong (Tiger Balm Factory), 179 Wanchai Rd., Hong Kong: plastics, chemicals, machinery.

Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	April, 1946		April, 1945	
UNMANUFACTURED	Quantity	Value	Quantity	Value
Balata ... lbs.	1,958	$ 1,006	....	....
Crude rubber ... lbs.	2,310,966	442,485	5,836,291	$ 2,333,327
Gutta percha ... lbs.	1,000	2,939	....	....
Rubber, powdered, and waste ... lbs.	734,300	1,379,000	746,700	2,530,400
Recovered ... lbs.	2,754,200	21,595,900	2,046,900	15,302,700
Synthetic and substitute. lbs.	1,137,500	26,495,700	617,800	20,769,400
TOTALS ...	6,939,924	$49,917,030	9,247,691	$40,935,827
PARTLY MANUFACTURED				
Hard rubber in rods or tubes ... lbs.	813	$ 522	1,113	$ 1,006
Rubber thread, not covered lbs	7,365	11,881	8,862	14,584
TOTALS ...	8,178	$ 12,403	9,975	$ 15,590
MANUFACTURED				
Belting ...	....	$ 52,848	....	$ 26,904
Boots and shoes of rubber, n.o.p. ... prs.	9,912	6,275	13,796	14,373
Canvas shoes with rubber soles ... prs.	240	607	....	....
Cement ...	....	29,447	....	14,785
Clothing of waterproofed cotton or rubber ...	....	671	....	758
Druggists' sundries ...	....	31,858	....	31,613
Gaskets and washers ...	....	29,047	....	15,710
Gloves, rubber ... doz. prs.	1,109	3,329	762	3,777
Golf balls ... doz.	1,012	6,887	4	13
Heels ... prs.	924	171	....	....
Hose ...	....	25,517	....	32,922
Hot water bottles ...	....	3,051	....	....
Inner tubes, n.o.p. ... no.	215	950	128	583
Bicycle ... no.	348	276	1,533	1,018
Liquid sealing compound ...	....	15,749	....	9,964
Mats and matting ...	....	35,411	....	22,224
Nursing nipples ... gross	3,085	8,321	451	1,944
Packing, rubber ...	....	17,123	....	14,687
Tire repair material ...	....	3,325	....	9,332
Tires, bicycle ... no.	550	603	1,431	1,522
Pneumatic ... no.	332	14,730	111	3,167
Solid, for automobile and motor trucks ... no.	2	32	13	718
Other ... no.	....	2,358	....	1,385
Other rubber manufactures ...	....	271,455	....	165,150
TOTALS ...	....	$ 560,041	....	$ 372,549
TOTALS RUBBER IMPORTS ...	....	$50,489,474	....	$41,323,966

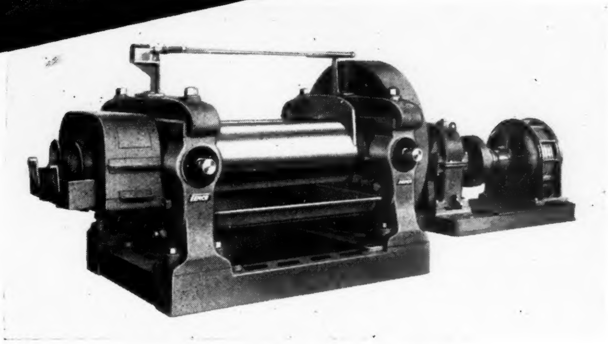
Exports of Crude and Manufactured Rubber

	April, 1946		April, 1945	
UNMANUFACTURED	Quantity	Value	Quantity	Value
Crude rubber including synthetic rubber ... lbs	2,770,334	$ 538,978	1,302,790	$ 495,848
Waste rubber ... lbs.	1,742,600	2,320,800	2,808,200	3,881,800
TOTALS ...	4,512,934	$ 2,859,778	4,110,990	$ 4,377,648
PARTLY MANUFACTURED				
Soling slabs of rubber ... lbs.	1,710	$ 64	3,910	$ 437
MANUFACTURED				
Belting n.o.p. ... lbs.	341,201	$ 207,155	124,160	$ 70,017
Belts, fan ...	....	2,696	....	....
Boots and shoes of rubber, n.o.p. ... prs.	131,433	225,605	165,641	343,835
Canvas shoes with rubber soles ... prs.	102,405	103,417	5,674	4,516
Clothing of rubber and waterproofed clothing ...	....	42,564	....	2,283
Heels ... prs.	184,246	15,276	179,162	24,647
Hose ...	....	51,713	....	59,844
Inner tubes for motor vehicles ... no.	39,764	97,315	51,584	225,156
Soles ... prs.	7,432	2,151	1,032	189
Tires, pneumatic for motor vehicles ... no.	42,618	830,848	53,239	2,547,591
Others ... no.	3,429	5,697	177	6,425
Wire and cable, insulated ...	....	95,082	....	421,444
Other rubber manufactures ...	....	79,762	....	297,119
TOTALS ...	....	$ 759,281	....	$ 4,003,066
TOTALS, RUBBER EXPORTS ...	....	$ 3,619,123	....	$ 8,381,151

AFRICA

Considerable interest is being shown in municipal and industrial circles in South Africa in the new British plastic, Polythene, says a foreign press report. It is understood that the Port Elizabeth municipality has sanctioned the use of Polythene-insulated cables for home and factory wiring and that installation will begin as soon as supplies arrive from the British manufacturers.

RUBBER & PLASTICS HEAVY DUTY MILLS



STURDY, dependable and built for long life, EEMCO Mills are made in standard sizes from the 12-inch Laboratory Mill up to and including an 84 inch Mill. Furnished as single units or for operation "in line" of two or more. Floor level drives are provided when wanted. Write EEMCO for your Rubber or Plastics Processing Machinery needs - - - early deliveries are now being made.

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SULPHUR and CHEMICALS FOR THE RUBBER INDUSTRY

CRYSTEX INSOLUBLE SULPHUR

Commercial Rubbermakers' Sulphur, Tire Brand, 99½% Pure

Refined Rubbermakers' Sulphur, Tube Brand, 100% Pure

Carbon Tetrachloride, Carbon Bisulphide

Caustic Soda, Sulphur Chloride

Stauffer Chemicals Since 1885

STAUFFER CHEMICAL CO.

420 Lexington Ave., New York 17, N. Y.
444 Lake Shore Drive, Chicago 11, Ill.
636 California St., San Francisco 8, Cal.
555 So. Flower St., Los Angeles 13, Cal.

424 Ohio Building, Akron 8, Ohio
North Portland, Oregon
Houston 2, Texas
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ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
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Allow nine words for keyed address.	**Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.**	*Replies forwarded without charge*

SITUATIONS WANTED

CHEMIST, NATURAL AND SYNTHETIC RUBBER LATEX, EMULsions, plastics, B.S. degree and 3 years' experience. Address Box No. 581, care of INDIA RUBBER WORLD.

CHEMIST, B.S., CONSIDERABLE EXPERIENCE IN ADHESIVES, lacquers, rubber cements. 6 years' adhesive tapes from natural and synthetic bases, coated on film, cloth, paper, foil. Laminating adhesives for all types of sheet materials. 10 years' plastics, coating lacquers, rubber cements. Reliable, unselfish assistant to chief chemist, to help in production and development. Salary $300. Address Box 568, care of INDIA RUBBER WORLD.

CHEMIST—4 YEARS' EXPERIENCE AS CHIEF RUBBER COMpounder for insulated wire plant. Wants responsible position with progressive organization. Full knowledge of development and manufacture of wire. Factory experience. Capable of managing small rubber plant. Interested in any field of rubber products. Age 38. Married. B.S. degree in Chemical Engineering. Reliable. Efficient. Location secondary. Minimum salary $4,000. Address Box No. 571, care of INDIA RUBBER WORLD.

SALESMAN AND BUYER—RUBBER, SYNTHETICS, PLASTICS—married, young, college, healthy, and a real go-getter. Will go anywhere as sales representative or branch manager. Large following in the Rubber Industry. Have made touchdowns on the gridiron; now let me make them for you. Address Box No. 579, care of INDIA RUBBER WORLD.

FACTORY MANAGER DESIRES LOCATING WITH RELIABLE organization, preferably in the East. Thirty years' executive experience in connection with all phases of rubber manufacturing procedure, including natural, synthetics, and plastics: compounding, milling, calendering, extruding, curing and finishing, mechanical goods, specialties, hard rubber, sponge products, etc. Have numerous trade connections and know costs. Address Box No. 580, care of INDIA RUBBER WORLD.

RUBBER ENGINEER, CAPABLE AS TECHNICAL OR SUPERINtendent of production, desires new connections. 22 years of practical experience in the manufacture of mechanical rubber goods from natural, reclaim and synthetic rubbers. Experienced also in plastics, resins, and latices. Well educated. Address Box No. 569, care of INDIA RUBBER WORLD.

TECHNICAL SALES OR SALES SERVICE POSITION IN THE rubber or rubber chemicals field desired by young man, 28, with good knowledge of mechanical rubber products and bonding mediums. Experience includes development, compounding, production, supervision, and sales service. Address Box 584, care of INDIA RUBBER WORLD.

EXECUTIVE POSITION WANTED. 25 YEARS' PRACTICAL EXperience in the manufacture of mechanical rubber goods. Have worked from extruding machine operator to assistant general superintendent for one of the oldest manufacturers of molded specialties and cut washers. Address Box No. 585 care of INDIA RUBBER WORLD.

SITUATIONS OPEN

EXPERIENCED CHEMIST

Rapidly expanding company located in small community 70 miles from Chicago has unusual opportunity for chemist experienced in development of plastic and rubber coatings and saturations. Experience important. Salary flexible to suit qualifications. Address Box No. 586, care of INDIA RUBBER WORLD.

ADHESIVES—RUBBER CHEMIST TO HEAD LABORATORY REorganization program with wide experience in the development and production of natural and synthetic rubber adhesives and related products. This permanent position offers an excellent opportunity with a long-established firm in the Greater New York Area. State education, experience, availability, salary requirements, etc. Applications will be held in strictest confidence. Address Box No. 572, care of INDIA RUBBER WORLD.

SALESMAN CHEMIST—BY A YOUNG AND RAPIDLY EXPANDing organization supplying pigments and chemicals to the Rubber, Plastics, and Paint industries. Must be a chemist by training and preferably have a well-rounded experience in rubber compounding. While experience as a salesman is desirable, it is not essential. Substantial salary and expenses plus bonus which will directly reflect general usefulness and ability to produce. Will be located in the East. All inquiries will receive a reply and will be treated in strict confidence. Our own organization has been advised of this advertisement. Address Box No. 574, care of INDIA RUBBER WORLD.

CHEMIST—SUPERINTENDENT FOR MOLDED AND EXtruded goods. Set up new operation for established firm. Select and install additional machinery. Stock inducement-bonus plan. State full experience, age, salary, etc. Address Box No. 575, care of INDIA RUBBER WORLD.

RUBBER CHEMIST: GRADUATE CHEMIST OR CHEMICAL engineer with some experience in rubber compounding and development work. Tire experience desirable. Excellent opportunity with young expanding organization. Send details of education, experience, and salary desired. Address Box No. 576, care of INDIA RUBBER WORLD.

WANTED: TECHNICAL GRADUATE, 30 TO 35, MOLDED RUBber goods production experience for productive supervision with medium-sized rubber company in midwest area. Salary open. Address Box No. 582, care of INDIA RUBBER WORLD.

CHEMIST—EXPERIENCED IN PRODUCING RESIN EMULSIONS in connection with crude and synthetic latex compounding for the adhesives field. Excellent opportunity with well-established firm located in large midwest city. State experience, age, and education in reply. Address Box No. 583, care of INDIA RUBBER WORLD.

(Classified Advertisements Continued on Page 600)

Classified Advertisements

Continued

MACHINERY AND SUPPLIES FOR SALE

FOR SALE—1 EXPERIMENTAL MILL WITH MOTOR. ADDRESS Box No. 570, care of INDIA RUBBER WORLD.

ONE #9 BANBURY MIXER; ONE 24"x72" FARREL-BIRMINGHAM Mill; one 24"x60" Farrel Ansonia 3 Roll Calender; one 16"x42" Warm-up Mill. RUBBER LINING ENGINEERS, 2700 W. 35th Street, Chicago 32, Illinois.

ONE COMPRESSED ROLLING BALL TESTER DESCRIBED ON Page 300 of the "Vanderbilt 1942 Rubber Handbook." Complete except for motor. Also, 24-cavity Ball Mold. Perfect condition. R.T. VANDERBILT CO., INC., 230 Park Ave., New York 17, N. Y.

TWO THROPP RUBBER MILLS, 18" x 50"—RATIO 1.5 to 1, complete with Main Shaft, Reduction Drive, Safety Brakes, Guards, Oil Cups, and G. E. 150 H.P. Motor AC-220 Volts 600 R.P.M. with Starter and Control, and Spare Parts. This machinery was rebuilt in Dec., 1945, and is in use now. Address Box No. 578, care of INDIA RUBBER WORLD.

FOR SALE: 1—Thropp 15" x 30" Rubber Mill, complete, M.D.; 1—No. 3 Allen Tuber, motor driven, complete; 1—D & B 30" x 30" two-opening Hydraulic Press, steel heated platens, 12" diameter ram; 1—24" x 24" Adamson two-opening Hydraulic Press with 10" ram; 2—24" x 24" Farrel two-opening Hydraulic Presses with 10" ram; 1—24" x 24" Thropp, two-opening, Hydraulic Press with 10" ram; 1—18" x 18" Birmingham, two-opening Hydraulic Press with 6" ram; 1—Holmes Rubber Cutter; 1—French Oil Hydro-pneumatic Accumulator; 1—Worthington Hyd. Pump 1 x 6, 5 GPM, 6,000 pressure, M. D.; 1—W. & P. Mixer; 1—8 x 13" Rubber Mill; 1—Stokes Rotary 32-punch Preform Press; 2—Hydraulic Presses, 20 x 20"; Dry Powder Mixers; Pulverizers; Grinders, etc. Send for complete list. CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, New York 7, N. Y.

Classified Advertisements
Continued

MACHINERY AND SUPPLIES FOR SALE (Continued)

PROMPT DELIVERY: 1—Birmingham calender 3-roll 60"; 1—60" mill—new; 2—40" mills including motors. Address Box No. 573, care of INDIA RUBBER WORLD.

HYDRAULIC PRESSES FOR SALE, 3 SIZE 36" x 36", SINGLE-platen size 24" x 27"—47" opening without platen, 34" ram, 14" stroke. JOHNS-MANVILLE CORP., Manville, New Jersey. See: Mr. H. Ponisi.

FOR SALE: 2 ADAMSON 6" EXTRUDERS. 400-TON HYDRAULIC Extrusion Press. Hydraulic Presses from 12" x 12" to 42" x 48" Platens, from 50 to 500 Tons. Hydraulic Pumps and Accumulators.
WE BUY YOUR SURPLUS MACHINERY
STEIN EQUIPMENT CO.
426 BROOME ST., NEW YORK 13, N. Y.

MACHINERY AND SUPPLIES WANTED

WANTED: 1—50" MILL COMPLETE WITH MOTOR. MUST BE in excellent condition. Address Box No. 577, care of INDIA RUBBER WORLD.

WANTED: 1 CAMERON CUTTING MACHINE, MODEL 4-D Camachine #26, 50° preferred. Address Box 587, care of INDIA RUBBER WORLD.

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